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DETERMINANTS OF THE DECISION TO PARTICIPATE IN THE MARKETING OF GOATS BY RURAL HOUSEHOLDS IN ETHIOPIA

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DETERMINANTS OF THE DECISION TO PARTICIPATE IN THE MARKETING OF GOATS BY RURAL HOUSEHOLDS IN ETHIOPIA

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LIST OF ABBREVIATIONS AND ACRONYMS

BoA	Bureau of Agriculture
CSA	Central Statistics Agency
GDP	Gross Domestic Product
ETH	Ethiopia
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
FGLS	Feasible General Least Square
FIML	Full Information Maximum Likelihood
GARCH-M	Generalized Autoregressive Conditional Heteroscedasticity-in-mean
GO	Governmental Organization
HC	Heteroscedastic Consistent
HCCM	Heteroscedastic Consistent Covariance Matrix
IGAD	Intergovernmental Authority on Development
iid	identical and independent distribution
ILRI	International Livestock Research Institution
LIML	Limited Information Maximum Likelihood
LR	Likelihood Ratio
NGO	Non-governmental Organization
NPP	Normal Probability Plot
OLS	Ordinary Least Square
PDF	Probability Density Function
SSA	Sub-Sahara Africa
TLU	Tropical Livestock Unit
VIF	Variance Inflator Factor
SHM	Structural Heterosecdastic-in-Mean

ABSTRACT

The study aimed to identify factors that affect the decision and extent of market participation. Data were collected from 357 households and 1030 goats that are marketed. Focus group discussion was conducted to point out households marketing strategies. The study attempted to see both supply and demand side issues in different angles. Since the likelihood ratio test of no selection-biasness indicates selectivity of households marketing behavior, ordered tobit selection model was employed to analyze determinants of market participation decision and the extent of participation. To this effect, the ordered probit and multiple linear model were estimated simultaneously using Full information maximum likelihood estimation. All factors that affect market participation decision except distance to market, goat owned, and price of goat determined the extent of participation of net buyers, autarkic and net sellers. Transaction costs had indispensable role on why commercialization of goat is limited. As from the main objective of goat keepers observed their goat production was not designed in a manner to promote commercialization of goat. They used goat as a sort of walking bank. Hedonic price model was employed to analyze consumer's preference by fitting the revealed data. Implicit price analysis using ordinary least square estimation resulted estimates with standard errors that are heteroscedastic. As a result the study employed alternative robust estimation methods and based on Akaike, Bayesian and log-likelihood criteria of model selection, the modified structural heteroscedastic-in-mean is more appropriate for examining implicit price function. Goat markets were in-competitive. The common animal attributes had an impact on price of goat. However, animal attributes demanded by local and export market were different. Occasion had generally significant influence on price of goat. Goat marketed during festive periods in general and festive period that have an international demand in particular commands high price. Using revealed data, it was difficult to capture the influence of breed on price of goat. Empirical results regressed using those models as well as qualitative analysis of focus group discussion was consistent especially regarding marketing behavior of households. That is the negative sign of price risk premium shows that net sellers are not responsive to the change in price implying sellers that opt to sell are somewhat more desperate for cash. This is also in line with marketing strategies of households. The study mainly recommended improving access to information to promote both market participation and market orientation.

1. INTRODUCTION

1.1. Background

Ethiopia owns the largest livestock population in Africa - about 50 million cattle, 25 million sheep, 23.33 million goats and enormous amount of other livestock (Kassie, 2007; CSA, 2009; Kanani, 2009). Ethiopia accounts for 13.56% of 172 million goat population of Africa-making it the third largest producer of goats in Africa next to Sudan and Nigeria (Kanani, 2009). In 2008/09, the contribution of livestock for agricultural GDP in Ethiopia was 45% where goats are the second most important contributor herd species next to cattle (IGAD, 2010).

Among stallholder producers, apart from subsistence requirements, market participation forms an important area if decision as it has huge implications on their production, consumption and livelihoods. On the governments' side, markets represents a channel for micro and macro-economic policies that aim to improve welfare of rural households which reflects the need for understanding household market participation (Bellemare and Barrett, 2006; Balagtas, Coulibaly, Jabbar & Negassa, 2007). Counterfactually, if many households do not participate actively in markets or do not respond to market signals, market-based development strategies may fail to facilitate wealth creation and poverty reduction (Bellemare and Barrett, 2006). This leads to dampening of household's capacity to take advantage of market opportunities and government's capacity to influence microeconomic behavior through changing market incentives (ibid).

Increasing participation in agricultural markets is therefore a key factor to lifting rural households out of poverty in African countries (Delgado, 1995; Balagtas et al., 2007). Particularly, stimulating of market participation of smallholder livestock producers is a major pathway for getting rural people out of poverty and improving their food security, as livestock contribute to the livelihoods of more than two-thirds of the world's rural poor (ILRI, 2002).

Subsistence agricultural producers face several barriers that make it difficult for them to gain access to markets (Bahta and Bauer, 2012). This study therefore makes attempt to examine what impede factor the Ethiopia goat producers' participation in agricultural markets and also to identify the factors that limit the intensity of their participation.

1.2. Problem Statement

In Sub-Saharan Africa (SSA) total consumption of meat and milk is expected to double between 1997 and 2020 to reach 11.3 and 35.4 million tonnes, respectively (Ehui, Benin, Williams and Meijer, 2002). The increasing demand for livestock product presents new and expanding market opportunities for those small holder livestock producers who supply at least three-fourths of livestock production in developing countries (Delgado, 1995; Ehui et al., 2002). To exploit these economic opportunities rural households need to be more market oriented in production and increases their participation in agricultural markets.

Smallholder farmer's participation in agricultural markets is an important pathway towards economic growth and development for countries like Ethiopia which own large livestock resources. In rural areas of the developing world, however, significant market frictions commonly impede market participation (Bellemare and Barrett, 2006). As a result smallholders find it difficult to take advantage of the existing market opportunities because of a range of constraints and barriers reducing the incentives for participation (Makhura, Kirsten, and Delgado, 2001).

While participation in agricultural markets can be an important strategy for rural households to escape from poverty (Heltberg and Tarp, 2001), many smallholder farmers and pastoralists in Ethiopia do not participant in the livestock market (Negassa, Rashid, and Gebremedhin 2011)., 2011). In particular, 50 percent of the smallholder farmers neither sold nor bought goats (CSA, 2005). The figure is even higher in the pastoral areas among the Borana pastoralists for example;

the non-participation rate is as high as 66% (ibid). Given the limited market participation, the size of transactions (as measured by the number of heads of cattle, sheep, or goats sold or purchased) is also very small (ibid). However, due to the emerging of financial institution allowing pastoralists to diversify their risk, holding assets in a different and perhaps safer form, the marketing behaviour and participation of livestock producers are changing (Desta 1999). Along with the finding of Devendra (1999), the changes taking in the market participation and behaviour of livestock producers implies that farmers' market participation can be improved if the drivers of the tendency to participate in agricultural market are properly understood and appropriate mitigation measures taken.

In the process of agricultural product commercialization, unless market orientation (i.e. a situation where production decisions are based on market signals) is considered, participation in agricultural market alone could not be adequate to take advantage of the existing market opportunities (Gebremedhin and Jaleta, 2010). Therefore, both market participation and market orientation are important for agricultural product commercialization. Prices act as market signals that convey information to the buyers and sellers in a market. Therefore, identifying determinants of market orientation for a specific commodity alone is less informative showing the need for a deeper understanding of factors that determine formulation of goat prices.

Different studies found that consumer's utility is derived from the characteristics of the goods they consume and not the goods themselves regardless of their quality attributes (Lancaster, 1966 and Lucas, 1974). The intuition is that the market price of a goat, for example, is a function of consumers' utility for the animal's attributes assuming market is perfect. Accordingly, producers fetch higher premium when they can target consumer's utility for animal's attributes. The influence of animal attributes on price formulation is different between livestock species and breeds and also between market regions (e.g Ayele, Jabbar, Teklewold, Mulugeta, and Kebede, 2006.; Teklewold, Legese, Alemu, and Negassa, 2009; Kassa, Haile, and Essa, 2011).This apparently shows that proper and adequate studies for each livestock species and breed across different market regions are needed.

Literature on livestock market participation and analysis of implicit price of animal attributes has been thin in SSA in general and Ethiopia in particular. Past studies that concentrated on market participation of livestock producers mainly used the ordered tobit model of market participation (Bellemare and Barrett, 2006) and Heckit model of market participation (Ehui, Benin and Paulos, 2009). Moreover, the few studies conducted in Ethiopia on market participation of goat do not provide analysis which is disaggregated by species.

There exist a number of studies that aim at identifying the determinants of livestock price formulation in Ethiopia (Andargachew and Brokken, 1993; Adugna, 2006); Ayele et al., 2006; Teklewold et al., 2009; Kassa et al., 2011; Kassie, Abdulai, and Wollny, 2011; Terfa, Haile, Baker, and Kassie, 2012). Among these, Ayele et al. (2006) and Teklewold et al. (2009) analyzed the determinants of goat prices. However, they exclude some of the important animals' attributes such as sex and live weight which are believed to be very important in influencing consumer utility and producer decision (Jabbar, 1998).

In general, the extant of empirical evidence on market participation and implicit price analysis in Ethiopia are thin. In addition, it is hardly possible to find literature that provides comprehensive insight on those issues.

1.3. Research Questions

The research questions of the study are the following;

1. What factors affect the decision and scale of market participation by smallholder goat keepers?
2. Which attributes of animal affect goat price in the local market?
3. What marketing strategies lead to higher prices?

1.4. Objectives

The main objective of the proposed study is investigating of factors affecting the decision and scale of market participation by smallholder goat keepers.

The specific objectives of the study are as follows;

1. To identify attributes of animal affect goat price in the local market.
2. To point out marketing strategies for goat leads to a higher prices.

1.5. Significance of the Study

The study is significant for numerous reasons. First, the result of such study offer evidence for selectivity of household goat marketing behavior. Second, it provides insight on the driving forces of smallholder goat producer commercialization. Third, it will reveal the existence or absence of goat marketing price variability across space, animal attributes and buyer type and purpose of purchase.

In general, such a study is worthwhile because the benefits of its outcomes are manifold: 1) smallholder goat producers can utilize the information generated to take advantage of market opportunities 2) government can utilize them to influence microeconomic behavior through changing market incentives and 3) Researchers and extension agents can utilize the findings of the research to guide future direction and emphasis of future research and extension.

1.6. Scope and limitation of the study

The study seeks to examine factors that determine farmers' decision and extent of participation in goat markets and goat market price using cross-sectional data collected from three study regions.

The study is not however free from certain limitations. Household's poor recording habit on such variables as volume of transaction, price of goat and transaction costs has posed some problems which is not surprising in cross-sectional data especially for developing countries. Moreover, for interest of time, implicit price analysis has been conducted only for a selected season in a year. It was also difficult to document socioeconomic characteristics of goat sellers.

2. LITERATURE REVIEW

2.1. Role of Goat Production in Ethiopia

Peacock (as cited in Peacock, 1995) stated that goats provide to their owners with a broad range of products and socio-economic services and have played an important role in the social life of many African people, being used as gifts, dowry, in religious rituals and rites of passage. Goat can play vital role in ensuring the food security of a household, often being the only asset possessed by poor family (Peacock, 2005). Moreover, goat is critical to safeguarding the security of family members in time of trouble such as crop failure or family illness (ibid). Broadly speaking, the contribution of goat particularly to poor farm households is much higher than is imagined in Africa (Devendara, 1999).

In general, goats are important to the socioeconomic well being of people in developing countries in the tropics in terms of nutrition, income and intangible benefits (i.e., savings, an insurance against emergencies, cultural and ceremonial purposes)(Kosgey, 2004). Likewise, goats contribute significantly to the subsistence, economic and social livelihoods of a large portion of the population in low-input and smallholder production systems particularly goat used as a quick source of cash by millions of keepers in Ethiopia (Ayalew, 2000; Tibbo, 2006).

2.2. Production and Consumption Theories

The conceptual framework for production in this study is mainly based on the theory of rural household decision making reviewed in Chiappori, Haddad, Hoddinott, and Kanbur (1995) and Udry (1996). Since livestock keeping is a result of an economic decision made by households, livestock owners become self-selected (Balagtas et al., 2007). To correct this important selection bias, the study focused only potentially goat producer households and districts. It makes possible for inference to be made about market participation and magnitude of sales by smallholder goat producers in the entire population based on a random sample of households.

Theoretical model of household marketing behavior, highlighting the implications of different assumptions about whether households make participation and volume of transaction decision in two-step process, are therefore adopted (Goetz, 1992; Key, Sadoulet, and De Janvry, 2000; Bellmare and Barrett, 2006).

The theoretical framework of consumption for this study is based on a new approach which starts with the premise that consumer's utility is derived from the characteristics of the goods they consume and not the goods themselves (Lancaster, 1966). As a result, utility anticipated by the buyers are ranked indirectly through the characteristics that the goods possess. Based on the hedonic price analysis (Rosen, 1974; Lucas, 1975), goats are valued for their utility-bearing attributes or characteristics.

2.3. Small holder farmers market participation and magnitude of sales

The importance for promoting smallholder market participation has been increasingly recognized in efforts to bring about agricultural transformation in developing countries (Braun and Kennedy, 1994). Delgado (1995) suggested that in African countries, increasing participation in agricultural markets is a key factor to lifting rural households out of poverty.

Ehui et al.(2009), in line with Braun and Kennedy (1994) and Delgado (1995), suggested that market participation and increasing the size of sales of livestock and livestock products significantly improve the income and welfare of smallholder livestock producers and help to alleviate poverty. However, smallholder subsistence farmers especially in SSA, find it difficult to participate in markets because of a range of constraints and barriers reducing the incentives for participation (Makhura et al., 2001; Balagtas et al., 2007).

The main factors that affect market participation and sales include imperfect or incomplete markets and lack or shortage of human, physical and financial capitals (Sadoulet and de Janvry,

1995; Bellemare and Barrett, 2006; Alene, Manyong, Omanya, Mignouna, Bokanga, and Odhiambo, 2008; Ehui et al., 2009; Gani and Adeoti, 2011). Sadoulet and de Janvry (1995) stated that market imperfection is attributed due to transaction costs.

Transaction costs are the embodiment of access barriers to market participation by resource poor smallholders (Delgado, 1999; Holloway, Nicholson, Delgado, Staal and Ethui, 2000). Transaction costs of smallholder market participation often increases due to poor infrastructure (Lapar, Holloway and Ehui, 2003; Bellemare and Barett, 2006). Holloway et al. (2000) found that farmers with lower transaction cost participated in markets and sold more because they were likely to recover their production and marketing costs.

Transaction cost includes the costs of searching for a trading partner with whom to exchange, the costs of screening partners, bargaining, monitoring, enforcement and, eventually, transferring the product to its destination (Jaffee and Morton, 1995; Hobbs, 1997). Transactions costs are broadly categorized into fixed (unobservable) and proportional or variable (observable) costs (Key et al., 2000; Hobbs, 1997; Alene et al., 2008).

Fixed fees are invariant to the volume of transaction and are often lumpy; in contrast, variable fees are fees per unit of transaction (Bellemare and Barrett, 2006). In a neoclassical model of labour supply Cogan (1981) noted that fixed costs are known to exist irrespective of the volume of transactions and surely affect the decision about how much quantity to supply to the market. Different studies stated that fixed transaction costs determines market participation decision while the supply decisions (amount sold), conditional on market participation, depend on both variable and fixed transaction cost (e.g. Gotez, 1992; Hobbs, 1997; Bellemare and Barrett, 2006)

Because transaction costs have a large unobservable component, attempting to observe transaction cost directly will always underestimate their importance quite likely by large

amounts, hence their measure can only be indirectly revealed from the behaviour of potential agents in the market (Vakis, Sadoulet, and de Janvry, 2003). Thus, with the exception of transactions costs attributes like distance to markets and transportation costs, aspects like market information or search and bargaining procedures are rarely included in most surveys and are unlikely to be comprehensive when included in measuring transactions costs from observed behaviour (ibid). As a result, the standard estimation of market supply equation fails to account for these fixed costs (Holloway et al., 2000).

2.4. Consumer behavior and implicit Price of attributes

Lancaster (1966) has argued that the traditional theory of consumer behaviour is inappropriate to explain consumers' utility function. He introduces new theory that is properties and characteristics of a given good produce utility to consumers. Goods are valued for their utility-bearing characteristics, not for the good itself. Each attribute can be evaluated by consumers when making a purchasing decision and an implicit price can be identified for each of them (Rosen, 1974; Orrego, Defrancesco and Gennari, 2012). The revealed goat price is therefore a composite of the implicit values of the attributes of the particular animal being marketed.

Hedonic prices, defined as the implicit prices of attributes, are revealed to economic agents from observed prices of differentiated products and the specific amounts of characteristics associated with them. A hedonic price function describes the equilibrium relationship between the economically relevant characteristics of a product and its price. Hedonic prices can be used to predict prices for new goods, to adjust for quality changes in the price of a good and to measure consumer and producer valuations of differentiated products (Rosen, 1974; Lucas, 1975; Orrego et al., 2012).

In a competitive market, an implicit price is a function of the product attributes alone and not of individual consumer or supplier attributes (Rosen, 1974; Oczkowski, 1994). Studies conducted in

Ethiopia by Andargachew and Brokken (1993), Ayele et al. (2006) and Kassie et al. (2011) confirm that animals market is in-competitive. An implicit price is therefore a function of both product attributes and individual consumer or supplier attributes.

2.5. Markets and marketing strategies

Many researchers emphasize the positive role of liberalization of markets to enhance the welfare of smallholders; however, the role of markets can differ according to environmental conditions and the nature of farmers' assets (Alary, Aboul-Naga, El-Sheifa, M., Abdelkrim and Metawi, 2012). For instance, livestock characterize in dry land areas as the major marketable assets (Binswanger and McIntire, 1987) as well as a major social capital in the sense of security (Turner and Williams, 2002), which makes marketing strategies of livestock more complex (Alary et al., 2012).

Kassa et al. (2011) and Andargachew and Brokken (1993) found out price of goats, like other products, are determined by demand and supply given the attributes of the animals offered for sale. Goat demand is consistently on the rise due to significant population increases, rural-urban migration and the experience of increasing income among most developing countries. It is also affected by seasonal factors such as festivals and fasting, availability of related products and redistribution of animals between producers for growing, fattening and reproduction (Wirnock, 1983).

The supply of goats should be more price responsive than cattle given the shorter reproduction cycle, but several phenomena affect market supply independently of price (Wirnock, 1983). The number of goats supplied to a market are affected by availability of feed (lambing season) and cash needs (Andargachew and Brokken, 1993). Sandford (as cited in Wirnock, 1983) stated that producers typically sell animals at significant price discounts to equate herd size to the anticipated keeping capacity during the feed deficit period and to meet cash needs whenever the need arises.

2.6. Empirical evidences of households market participation decisions

2.6.1. Determinants of livestock market participation decision and magnitude of transaction

The factors that determine the decision on whether to participate in the market and at what scale can be broadly categorized as farmer's inherent factors and market and marketing related factors. A number of such factors are listed in the literature which include transaction costs (distance to roads, markets and towns, labor and transport availability, market information, search for better price), human capital (age, education, gender, extension service), physical capital (number of livestock producing stock, farmland) and financial capital (farm income, non-farm income, credit) (Bellemare and Barrett, 2006; Alene et al., 2008; Ehui et al., 2009; Gani and Adeoti, 2011).

Goetz (1992) and Holloway et al. (2000) stated that fixed transaction costs are the most significant from these barriers reducing market participation. Bellemare and Barrett (2006) found out that fixed fees have significant quadratic effect on market participation decision and exerts significant but differing effect on the quantity of bought and the quantity of sold.

Although many literatures revealed proportional transaction costs as a barrier for market participation like fixed transaction cost, some studies denies its impact on market participation decisions of smallholders. In this regard, Bahta and Baue (2007), Gani and Adeoti (2011) and Alene et al. (2008) confirmed that distance to preferred markets negatively and significantly affects market participation. In contrast, Balagtas et al. (2007) reported that distance to preferred markets positively and significantly affects participation in dairy markets in Cote d'Ivoire. Since, they also identify the availability of grazing area as another important factor. While Ethui et al. (2009) concluded that the physical distance from markets are not a barrier for market participation.

Rios, Masters and Shively (2008), using cross country data from Tanzania, Vietnam and Guatemala, concluded that capital has the potential to increase market participation. Unlike Rios, Ehui et al. (2009), studies conducted in Ethiopia, stated that capital has no uniform influence on livestock owner's market participation.

Human capital such as household size positively and significantly affects market participation decisions (Goetz, 1992; Belleme and Barett, 2006; Gani and Adeoti, 2011; Girma and Abebaw, 2012; Terfa et al., 2012). Contrary to those scholars, Ehui et al. (2009) finding reveals that the influence of household size on market participation decision is insignificant. Market participation decisions are also negatively and significantly affected by other human capital factors such as gender and age of the household head (Goetz, 1992; Alene et al., 2008; Girma and Abebaw, 2012). Bellemare and Barrett (2006) found out that age of household head has quadratic effect on market participation decision. In general, as Ehui et al. (2009) stated, the impacts of human and physical capitals on market participation are mixed.

Like the case of proportional transaction costs, there are different literature reports with contradicting findings on the relationship between physical capital and market participation decision. Among the different types of physical capital owned by farm households, livestock are the most important in terms of their influence on farmer's market participation decision. The number of livestock owned positively and significantly affects market participation decision (Balagtas et al., 2007; Bahta and Baue, 2007). While Bellemare and Barrett (2006) concluded that herd size have no influence on market participation decision rather on the amount of transaction particularly quantity of animals sold.

Financial sources of households, both farm and non-farm income, positively and significantly influence market participation decision of households (Ethui et al., 2009; Girma and Abebaw, 2012). Household income has influence on the quantity of transaction but not on market

participation of decision, income has positive (negative) effect on the quantity of bought and vice -verse for the quantity of sold (Bellemare and Barrett, 2006).

Studies on market participation and sales using double hurdle approach indicates factors that affect the decision by farmers on how much to sell will also affect the decision on whether or not to participate in the market and the vice- versa. However, there are factors that may influence the decision on whether or not to sell, but not how much to sell, for example, human capital variables (including age, sex of household and household size) (Ehui et al., 2009). likewise, there are particular factors that affect only volume of transaction, for example, variable fees and herd size that affect magnitude of transaction significantly (Bellemare and Barrett, 2006).

2.6.2. Determinants of livestock price

Empirical studies shows that animal attributes (sex, age, weight, body condition and colour of marketed animals), type of breed, occasions of transaction, type of buyers and their education status are an important observable influencing factors for livestock price formulation (e.g. Andargachew and Broken, 1993; Ayele et al., 2006; Adugna, 2006; Dossa, Rischkowsky, Birner and Wollny, 2008; Teklewold et al., 2009; Kassa et al., 2011; Kassie et al., 2011).

The body weight of animal has statistically significant influence on price as found by Kassa et al. (2011), Adugna (2006), Dossa et al. (2008) and Andargachew and Broken (1993). Contrary to the study of Andargachew and Broken (1993), Kassa et al. (2011) and Adugna (2006) concluded that weight has quadratic effect on price on primary level of market.

Body weight is taken using measuring instrument whereas body condition is technical judgment of the animals by buyers. Thus body condition is a good indicator for dressing percentage and meat quality of animals. Body condition of the animals (cattle, sheep and goat) has decisive influence on price setting (Adugna, 2006; Teklewold et al., 2009; Kassa et al., 2011). In contrast,

Andargachew and Broken (1993) argued that body condition of sheep have no influence on price setting at different market level.

Studies conducted in Ethiopia (Andargachew and Broken, 1993; Ayele et al., 2006; Teklewold et al., 2009; Kassa et al., 2011; Kassie et al., 2011) on different livestock species found that age of animals has significant influence on price. Some literature considered age as continues variables and others as categorical variable that finds literature review difficult.

Age of the animals has diminishing marginal effect on price of cattle (Kassie et al., 2011) and small ruminant (Ayele et al., 2006). Teklewold et al. (2009) found that age, specifically matured age, put its influence on price of goat. In general, age of the animals may or may not influence price of animals either at the same or different market level (Andargachew and Broken, 1993; Kassa et al., 2011).

The influence of castration of male animals varies depending on the animal's species and market level. Adugna (2006) argued that castrated ox has no price variation with intact ox (that is not castrated). Studies conducted on the central high land of Ethiopia reveals that castrated rams have no influence on price on the primary market (Kassa et al., 2011) rather on the terminal market (Andargachew and Broken, 1993). Studies conducted in Benin, castrated male goat has significant impact on price regardless of market level (Dossa et al., 2008).

Contrary to Ayele et al. (2006) price of small ruminant in pastoralist area, Kassa et al. (2011) concluded that female sheep fetches higher price than male sheep at redistributive market. Evidences from different literature shows that the influence of sex of the animals on price is inconsistent along different market level and production system.

Studies conducted in Ethiopia on determinants of livestock price rarely included breed of animals as one determinant of price. However, certain literatures consider breed of animal, for instance, Jabbar and Diedhiou (2003) found that in some cases buyers in Nigeria pay significantly different prices for certain breed of cattle consistent with their preferences.

Literatures that consider color as an important determinant of price of goat are rare. Among the two small ruminants (i.e., sheep and goat), buyers preference for coat color of goat are indifferent. As a result coat color of goat has no significant effect on price formation of goat in Ethiopia (Ayele et al., 2006). Likewise, in Benin color has no effect on price of goat (Dossa et al., 2008). Despite, this study includes color as an important determinant of goat price since it is an important parameter for characterizing breed which is already considered.

2.7. Conceptual Framework

Figure 2.1 shows the categories of households as net buyer, autarkic, and net seller. Each category of households correlates with the extent of sale and/or purchase. Most variables that affect market participation decision also affect the extent of transaction. However, variables such as distance to market; it is an identification variable that only included in the first stage of the model; affect only the market participation decision. To the contrary, variable fees affect only the extent of sale and/or purchase because households incur variable fees if and only if they conduct transaction. In addition, price of goat exerts an influence on the extent of sale and/or purchase which, in turn, it is affected by animal attributes, sellers & buyers characteristics, market place and occasion.

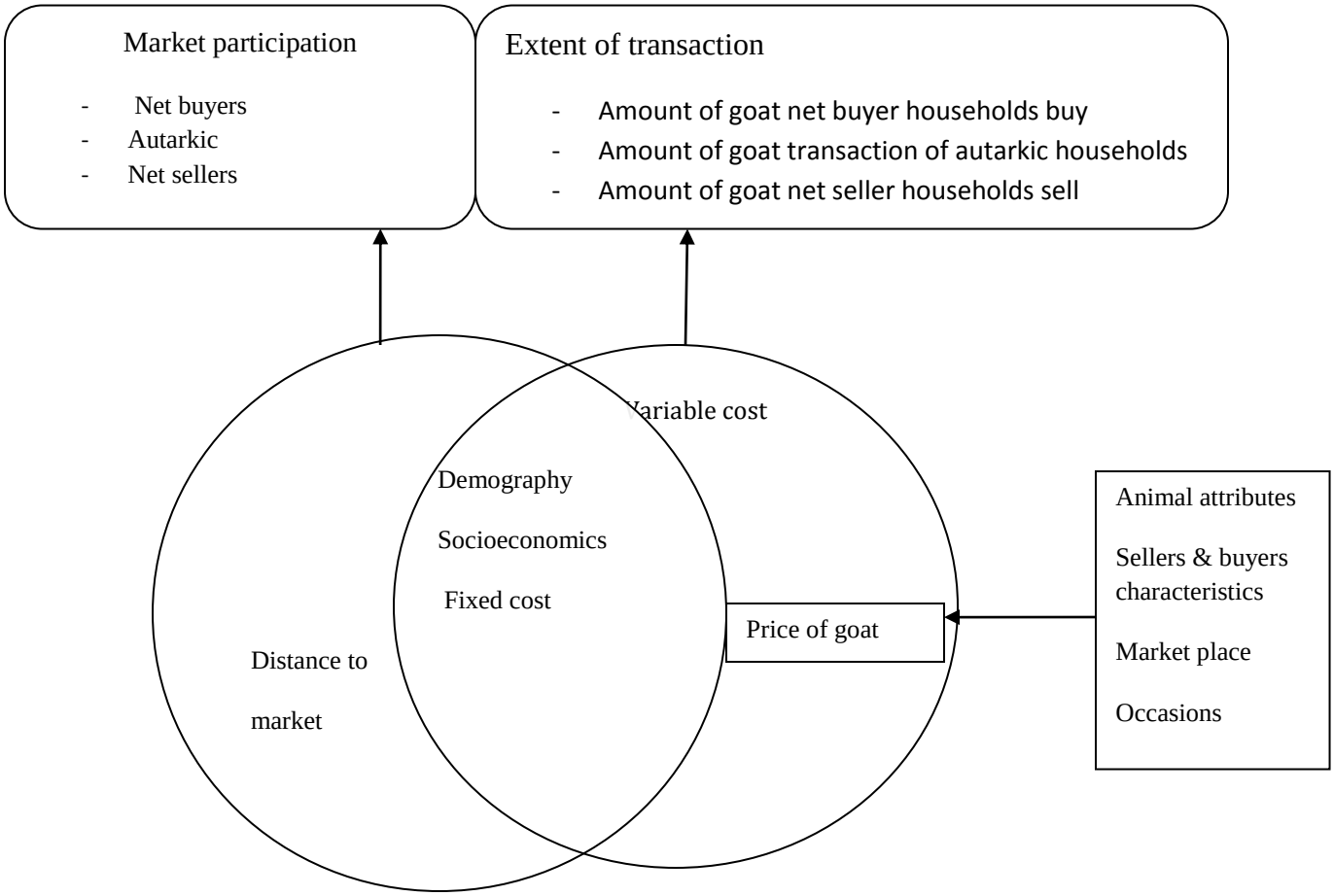


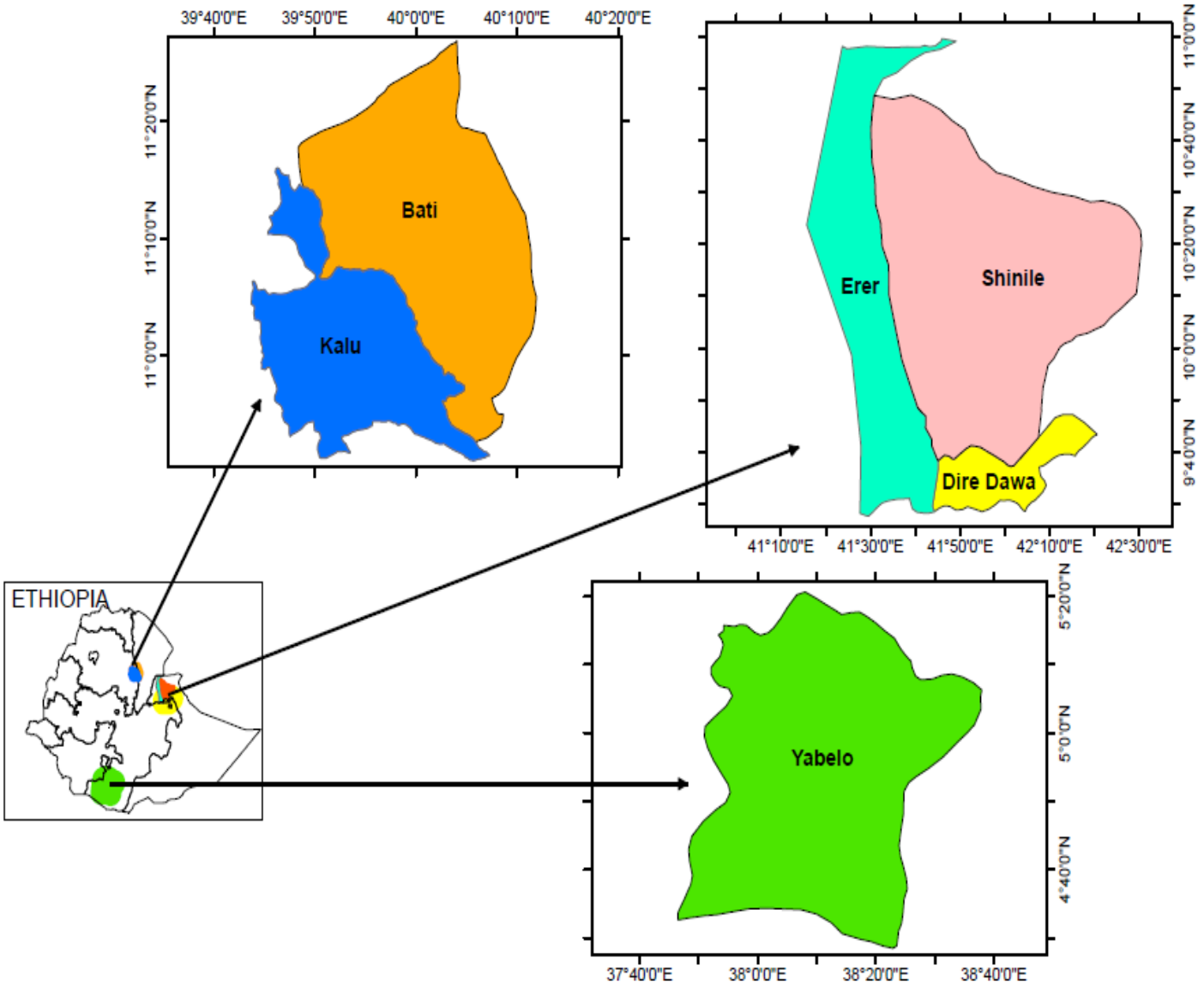
Figure 2.1. Illustration of the interaction of market participation and market orientation.

3. RESEARCH METHODS

3.1. Description of Study Area

The study was conducted on three livestock market zones based on their importance in the local livestock transaction points and strategic importance in terms of supplying sufficient numbers of different livestock species. Particularly, this study focused on Bati, Dire Dawa and Yabello livestock markets since they are the main sources of goats for abattoirs' and exporters'. A district in which each one of those livestock markets is located and other adjacent districts were selected to conduct the study on the determinates of households' market participation. Based on this, for the Bati market place, Bati district and kebele's from an adjacent district of kallo; for the Dire Dawa market place, Shenilie and kebeles from its adjacent district of Errer and for the Yabello market place, the Yabello district were selected for inclusion in to the analysis.

Bati woreda is located in North-Central Ethiopia in the Oromiya Administrative Zone of the Amhara region. Livestock production is categorized as the main source of livelihoods of the people of Bati. Shinile district is located in the North-West Ethiopia in the Shinile city administrative of the Somali regional state. Yabello is located in Southern Ethiopia in the Borana administrative zone of Oromia regional state. Yabello and shinile districts are lowland areas where pastoralism is the predominant livelihood activity.



Map 3.1. Location map of the study areas

3.2. Method of Data Collection

3.2.1. Sampling Methods

In order to achieve objective one, the study employed both probability and non-probability sampling techniques. The study districts as discussed above were selected purposively whereas kebeles (i.e., the smallest unit of administrative units) and rural households were drawn randomly. The study followed Cochran's (as cited in Battlett, Kotrlik, and Higgins, 2001) formula for categorical data to yield a representative sample size proportion.

The minimum sample size required for ensuring at least 95% confidence and 5% precision levels were determined using power analysis that is

$$n_0 = \frac{z^2 pq}{e^2}$$

Where n_0 is the sample size, z is the abscissa of the normal curve that cuts off an area α at the tails (leading to the desired confidence level of 1 – α, i.e., 95%) which has a tabulated value of level 1.96, *e* is the desired precision (in our case 5 %), *p* is the estimated proportion of market participants in pastoralist areas, i.e., 34% (Negassa et al., 2011) and q is 1-p. Accordingly, 357 households were selected from a total of 20 kebeles in the three study zones. Structured questionnaires were used for collecting social, economic and market related data from the sample households.

To achieve the second objective of this paper, market data were collected from purposively selected livestock market places during fasting, festive and normal (after three weeks of Easter) periods. Fasting time were also decomposed in to Christian fasting (Easter and Apostle fasting) and Muslim fasting (Ramadan). Bati and Yabello livestock market have specific market days and hence for a particular occasion markets data were collected in two sequential market days. Market data during festive periods were collected before and after the Easter and Ramadan

festive days within two weeks interval periods. While at Dire Dawa there is sheep and goat market for 365 days and no peak time of transaction. As a result it is impossible to collect enough data in one or two market days. Market data at Dire Dawa during selected occasions were collected for a week.

Market data includes price, weight, sex, dentition, body condition, color, horn orientation, type of breed, buyer's education and their purpose. The live weight for each animal was measured using 100 kg Salter balance. Age was approximated by the type and number of teeth following Yami and Mekel (2009) estimation guideline. Body condition was assessed by certain physical characteristics apparent in goat of different degrees of fatness, i.e., on and around the backbone in the loin and the last rib, and above the kidney (Nicholson and Butterworth, 1986 cited in Kassa et al., 2011).

Since breed is area specific, including both type of breed and market place together results perfect multicollinearity problem. As a result in this study, type of breed was included for their dual purpose. Type of breed can show price difference among marketed goat due to breed difference if there is more than one breed in specific market place and used as proxy for market location.

3.2.2. Data and Source

Structured questionnaire were used for collecting primary data from the selected households. Pre-testing of questionnaire was conducted in some of the districts and the development of the questionnaire was concluded by introducing necessary changes based on the findings of the pre-test. Focus group discussion and key informant interview were also conducted for collecting primary data. A separate questionnaire or data collecting format was also used to collect primary data from goat markets in the sample livestock market places. Both data were collected by trained enumerators under a close supervision of the researcher. Secondary data were also collected from the respective district Bureaus of Agriculture (BoA) and publication of the

Central Statistics Agency (CSA). The types of primary and secondary data that were collected from the different sources include both qualitative and quantitative data (as appropriate).

3.3. Method of Data Analysis

Based on the type of the data, the study was employed both qualitative and quantitative (i.e., descriptive and econometric) analysis.

3.3.1. Qualitative Analysis

Teklewold (2011) reviewed various qualitative data analysis techniques and concluded that there is no single methodological framework, however, there are similarities among different techniques of qualitative analysis. He boiled down the process as transcription, coding and categorizing, memoing, visualization, abstraction and generalizations, contrasting generalization with theories and models. Following this, the data collected using FGD were transcribed and triangulated with quantitative analysis.

3.3.2. Descriptive Statistics

Descriptive statistics (percentages, frequencies, means, standard deviations, t-statistic, and chi-square) were used to analyze the data and to extract stylized facts.

3.3.3. Econometrics

Econometric methods were employed to make inference about the population based on sample results. Particularly, the ordered tobit selection model was used to analyze the sample data and identify factors that affect market participation decision and volume of transaction. The hedonic pricing model was used to analyze how goat prices are formed.

3.3.3.1. An Econometric Model for the decision and Magnitude of Market Participation

The contemporary market participation models are the most commonly used type of sample selection models to avoid selection bias: first it is important to consider whether a household does market participation or not and then how much does household buy or sell if he or she is market participant (Goetz, 1992; key et al., 2000; Holloway et al., 2001; Bellemare and Barrett, 2006; Balagtas et al., 2007; Ethui et al., 2009). These scholars had difference in terms of specification of the second stage of the model (the extent of market participation). Except for Goetz (1992), and Bellemare and Barrett (2006), all others considered only the amount of sales. Goetz considered households as buyer or seller. However a household may buy and at the same time sell particular commodities. This peculiarity was explicitly captured in Bellemare and Barrett (2006). They partition households according to the net amount of commodities they buy or sell, as net buyer, autarkic or net seller.

Rather than just lumping net buyers, autarkic and net sellers together as "market participants" Bellemare and Barrett (2006) first estimates an ordered probit participation decision because these categories are logically ordered. Then it estimates a multiple linear model of volume of net sales (which, depending on the sign, can be distinguished as net sales or net purchases).

This study employed the ordered tobit model developed by Bellemare and Barrett (2006) that consists of an ordered probit selection rule as Chiburis and Lokshin (2007) discussed. The model assumes sequential choice and simultaneous estimation of the household market participation (discrete) and sale or purchase volumes decision (continuous). Household net sale (sale minus purchase) volume implies the presence of non-zero censoring point. Hence, household continuous market participation outcomes can be classified in to three distinct categories: net buyer (households whose net sales are strictly negative), autarkic (households whose net sales are equal to zero), or net seller (households whose net sales are strictly positive) households.

3.3.3.1.1. Market Participation Decision

In the first step of the model, households decide whether they will be net buyers, autarkic, or net sellers. In this study, a household net sales of goat equals its total sales of goat minus its total purchases of goat, S_t, so net sales partition into three distinct parts as net buyer ($S_t < 0$), autarkic ($S_t = 0$) and net seller ($S_t > 0$) households. The ordered probit can be derived from a latent model that is identical to the ordinary probit model (Davidson and MacKinnon, 1999). The model for the latent variable is

$$y_i^* = \mathbf{X}_i\boldsymbol{\beta}_i + \upsilon_i \qquad (3.1)$$

Household net sales actually observed is discrete variables y_i that can take three distinct informative partitions, i.e., net buyer, autarkic and net seller. The relation between the observed variable y_i and the latent variable y_i^* is assumed to be given by

$$y_i \begin{cases} 0 & \text{if } y_i^* \leq \mu_1; \\ 1 & \text{if } \mu_1 < y_i^* \leq \mu_2; \\ 2 & \text{if } y_i^* > \mu_2 \end{cases}$$

Where $y_i = 0$ for net buyer ($S_t < 0$), $y_i = 1$ for autarkic ($S_t = 0$), and $y_i = 2$ for net seller ($S_t > 0$). $\boldsymbol{X}_i$ is a vector of variables that are expected to explain the variation in y_i. β_i is a vector of an unknown vector of parameters and υ_i is an error terms assumed to be distributed standard normal, and the unknown threshold parameters μ_1 and μ_2 satisfy $\mu_1 < \mu_2$. We assume that the independent variables x_i and the categorical dependent variable y_i are observed, but the latent variable y_i^*(i.e., the utility the household gets from participating in the market) is unobserved.

3.3.3.1.2. The Magnitude of Market Participation

The second stage decision of how much net buyer households buy and how much net seller households sell is an observed dependent variable z_i which is a linear function of some observed independent variables w_i, but the coefficient of w_i depend on the category of y_i

$$z_i \begin{cases} \gamma_0 w_i + \varepsilon_{i0} \text{ if } y_i = 0, \\ \gamma_1 w_i + \varepsilon_{i1} \text{ if } y_i = 1, \\ \gamma_2 w_i + \varepsilon_{i2} \text{ if } y_i = 2 \end{cases} \quad (3.2)$$

Where for each category ε_i has mean 0, variance σ^2, and is bivariate normal with υ_i with correlation rho (ρ). It is also assumed that the error terms ε_i and υ_i are independently and identically distributed across observations.

3.3.3.1.3. Ordered Tobit Selection Model

The ordered tobit selection model is an extension of the heckman (also called the Heckit) selection model (Bellermare and Barrett, 2006 and Chiburis and Lokshin, 2007). While the Heckman selection model (Heckman, 1979) is suitable for binary dependent variables cases, the ordered tobit model proposed by Bellermare and Barrett (2006) is suitable for ordinal triple valued dependent variables cases. Bellermare and Barrett (2006) call the ordered tobit as an extended heckman selection model and hence the three different names (the ordered tobit, ordered probit and extended heckman) are used in the literature interchangeably. In this paper, we refer to it as the ordered tobit model.

Chiburis and Lokshin (2007) noted that estimating any of equation (3.2) as Heckman (1979) proposed for the binary case generally leads to biased results. The justification they provided is that, $\mathbf{z}_i$ could be missing for certain categories, in which case,γ, ρ, and σ of missing categories do not exist. Therefore, this study considered Heckman selection model which is re-defined by Chiburis and Lokshin (2007) as follows;

$$\lambda_i \equiv \mathrm{E}[\upsilon_i | y_i, x_i] = \frac{\phi(\mu_j - x_i\beta_i) - \phi(\mu_{j+1} - x_i\beta_i)}{\Phi(\mu_{j+1} - x_i\beta_i) - \Phi(\mu_j - x_i\beta_i)} \quad (3.3)$$

Where $j \in \{0, 1, 2\} = y_i$. Then

$$E[z_i | x_i, w_i] = \gamma_j w_i + E[\varepsilon_{ij} | z_i = j, x_i]$$

$$= \gamma_j w_i + \rho_j \sigma_j \lambda_i \quad (3.4)$$

Now it is possible to consider an OLS regression of z on w over the subsample {i: y_i = j}. The model could be consistently estimated using both the Full Information Maximum Likelihood (FIML) estimation procedure where the two equations (the selection and outcome) are estimated simultaneously and the two-step procedure where the ordered probit model is estimated first and then the outcome equation is estimated using the inverse mills ration (IMR) generated from the first stage estimation included as an explanatory variable in the second stage estimation. A significant estimate for the coefficient of the IMR variable in the second stage estimation indicates that selection bias indeed exists and hence correction of selection bias indeed was needed. On the other hand, insignificant coefficient of IMR means that selection bias was not a problem and hence simple OLS of the outcome (second stage) equation would lead to unbiased and consistent coefficient estimates (Lennox et al., 2012). This study employed the FIML estimation procedure.

FIML estimation consists of finding the parameter values that maximize the likelihood of the data. The parameters to be estimated are β; $\gamma_0, \gamma_1, \gamma_2$; μ_1, μ_2; ρ_0, ρ_1, ρ_2; $\sigma_0, \sigma_1, \sigma_2$ but as mentioned above β_j, ρ_j and σ_j do not exist for categories j in which Z is missing. Following Chiburis and Lokshin (2007), given the parameters, the likelihood of an observation i in which the category is j and Z_i is observed is

$$\begin{aligned} L_{ij}^{z} &= L[z_i, j \mid w_i, \gamma_i, \sigma_j, \rho_j, \beta, \chi_i, \mu_j, \mu_{j+1}] \\ &= L[z_i \mid w_i, \gamma_i, \sigma_j] \Pr[j \mid z_i, w_i, \gamma_j, \sigma_j, \rho_j, \beta, \chi, \mu_j, \mu_{j+1}] \\ &= \frac{1}{\sigma_j}\phi(t_i)\left[\Phi\left(\frac{\chi_i\beta_i + \rho_j t_i - \mu_j}{\sqrt{1-\rho_j^2}}\right) - \Phi\left(\frac{\chi_i\beta_i + \rho_j t_i - \mu_{j+1}}{\sqrt{1-\rho_j^2}}\right)\right] \end{aligned} \quad (3.5)$$

Where $t_i \equiv (y_j - \gamma_j w_i)/\sigma_j$, ϕ is the standard normal density function, and Φ is the standard normal cumulative distribution function.

If *j* is a category for which *y* is unspecified, then the likelihood is simply:

$$L_{ij}^{'} \equiv \Phi(\chi_i \beta_i - \mu_j) - \Phi(\chi_i \beta_i - \mu_{j+1}) \tag{3.6}$$

Taking the logarithm of *(3.5)* and *(3.6)* the log likelihood for the entire sample becomes:

$$L \equiv \sum_{i=1}^{n} \begin{cases} \log L_{iy_i}^{z}, \textit{if } y_i \textit{ is observed}; \\ \log L_{iy_i}^{'}, \textit{if } y_i \textit{ is missing} \end{cases} \tag{3.7}$$

Table 3.1. Definition of variables used for market participation decision and extent of transaction.

Variable name	Variables definition	Type of variables and measurement	Expected sign (+/-)
Particip	Households decisions to Participate in goat marketing	Categories; taking 0 for net buyers, 1 for autarkic, and 2 for net sellers	
TRNSCTLU	Amount of goat transaction in TLU	Continuous	
SEX	Sex of household head	Dummy; taking 0 for female and 1 for male	-
AGE	Age of household head in years	Continuous	-
AGSQU	The square of age of households head		
HHSZE	Number of individuals in the household	Continuous	+
MKTDIST	Distance to the nearest market in km	Continuous	+/-
FTRNSCST	Fixed transaction fees in Eth birr	Continuous	-
VTRNSCST	Variable transaction fees in Eth birr	Continuous	-
AVPRICE	Average price of goat marketed by a household in Eth birr	Continuous	+
INC	Annual income of households in Eth birr	Continuous	+
LNINC	Natural logarithm of annual income of households		+
TOTTLU	Number of livestock owned in TLU	Continuous	+
GSHRTLU	The share of goats in total TLU owned	Continuous	+

As shown in table 3.1 above, the number of livestock owned by the households and the amount of goat transaction are defined in tropical livestock unit (TLU) using the conversion ratio provided in appendix 1. The share of goats in the total TLU owned is computed as total goat owned in TLU divided by total livestock owned in TLU multiplied by 100. In terms of transactions costs, fixed fees are associated with transport, lodging and broker fees at Bati and Yabello markets while at Dire Dawa it is associated only with the former two fees. Variable fees are associated with animal transport and tax fees at Bati and Yabello market where as at Dire Dawa it is associated with animal transport and broker fees.

In this analysis, the annual household income is obtained by aggregating yearly sales of farm produce, livestock, livestock products, wood, charcoal, wage of employed household member, petty trades, remittances from members of households employed elsewhere and aid from GO's and NGO's. Daily income of households was computed by dividing the annual household income by 365 (the number of days in a year).

3.3.3.2. Hedonic Pricing Model

Model structure in general and functional form in particular is critical in building an accurate and consistent econometric model (Brown and Ethridge, 1995). This is even more with hedonic price equation estimations because functional form of the hedonic price equation is unknown and economic theory places few restrictions on the form of the hedonic function (Cropper, Deck and McConnell, 1988; Haab and McConnel, 2002). This implies lack of prior expectation on the functional form of the hedonic price function.

Simulation work of Cropper, Deck and McConnell (1988) show that regardless of the goodness-of-fit of the model, the linear and a linear-quadratic functional forms give the smallest mean square error of the true marginal value of attributes whether the attributes are unobserved variable or proxied by other variable. On the other hand, when choosing functional form and the set of variables to include, it is a must to bear in mind the almost the inevitable problem of

collinearity. Moreover, high collinearity makes the choice of a very flexible functional form less attractive, because the interactive terms of a flexible functional from often lead to greater collinearity (Habb and McConnel, 2002).

Following Cropper et al. (1988), Bin (2000) and Habb and McConnel (2002), this study adopted the log-linear functional form for hedonic analysis of goat prices. In his study of estimation of implicit prices in hedonic price models using housing price, Bin (2000) argue that the log-linear functional form is a benchmark parametric specification for hedonic price models. The model is specified as follows

$$ln(price) = \boldsymbol{X}_i\boldsymbol{\beta}_i + \varepsilon_i \quad (3.8)$$

Where $\boldsymbol{X}_i$ is the vector of independent variables including attributes of goat and socioeconomic characteristics of market actors, $\boldsymbol{\beta}_i$ is a vector of parameters to be estimated and $\boldsymbol{\varepsilon_i}$ is the error term which is assumed to be iid normal.

The conditional distribution of the errors given the matrix of explanatory variables has zero mean [$E\{\varepsilon_i\} = 0$], constant variance [$V\ \{\varepsilon_i\} = \sigma^2$], and zero covariance [$E\{\varepsilon_i x_i\} = 0$]. The reliability of the estimates based on these assumptions hardly hold in estimating parametric model using OLS. As a result the model should be tested for normality, specification error, multicollinearity, and heteroscedasticity.

In the presence of heteroscedasticity, OLS estimates are still unbiased, but may be inconsistent and hence the usual tests of significance are generally inappropriate and their use can lead to incorrect inference (Long and Ervin, 2000). This requires the use of the robust estimation procedure throug the derivation of an alternative estimator that is efficient or using OLS with adjusted standard error that is consistent but not efficient (Verbeek, 2004).

The first option employed in this study is heteroscedastic-consistent covariance matrix (HCCM) estimator that provides consistent estimator of covariance matrix. The original HCCM that is asymptotically justified is HC0 (White, 1980). However, it is not best possible covariance matrix estimator because least squares residuals tend to be too small (Davidson and Mackinnon, 1999). MacKinnon and White (1985) presented three alternative estimators known as HC1, HC2, and HC3. HC1 exhibits much of the same finite sample bias from which HC0 suffers (Cai and Hayes, 2008). Thus HC2 and HC3 are best possible covariance matrix estimator and the superiority of one over the other lies in its better properties when testing coefficients that are most strongly affected by heteroscedasticity (Long and Ervin, 2000).

The OLS, HC0, HC1, HC2, and HC3 of covariance matrix estimator of the error terms following White (1980) are specified as:

$$OLS = \frac{\sum e_i^2}{n-k}(X'X)^{-1}$$

$$HC_0 = (X'X)^{-1}X'diag[e_i^2]X(X'X)^{-1}$$

$$HC_1 = \frac{n}{n-k}(X'X)^{-1}diag[e_i^2]X(X'X)^{-1}$$

$$HC_2 = (X'X)^{-1}X'diag[\frac{e_i^2}{1-h_{ii}}]X(X'X)^{-1} \quad '$$

$$HC_3 = (X'X)^{-1}X'diag[\frac{e_i^2}{(1-h_{ii})^2}]X(X'X)^{-1} \qquad (3.9)$$

Where n is number of observation, k is number of parameters estimated, and $h_{ii} = X'(X'X)^{-1}$.

The second option that enables to deal with unknown form of heterosecdasticity employed in this study is feasible general least square (FGLS) (Long and Ervin, 2000). The error covariance matrix can more generally be expressed as

$$V\{\varepsilon|X\} = \sigma^2\psi \quad (3.10)$$

Where ψ is a positive definite matrix, it may depend upon X and it has unknown form.

Thus to obtain an error term that is homoscedastic, a transformation of matrix P such as the following is needed:

$$\psi^{-1} = P'P.$$

This can be rewritten as:

$$P\psi P' = I.$$

Consequently, it holds for the error term vector ε pre-multiplied by the transformation matrix P such that

$$V\{P\varepsilon|X\} = PV\{\varepsilon|X\}P' = \sigma^2 P\psi P' = \sigma^2 I.$$

As a result, the hedonic price model can be transformed by the P matrix to obtain:

$$P[ln(price) = PX\beta + P\varepsilon = ln(price)^* = X^*\beta + \varepsilon^*$$

The estimator for β is given by:

$$\beta = (X^{*\prime}X^*)^{-1}X^{*\prime}y^* = (X'\psi^{-1}X)^{-1}X\psi^{-1}y.$$

The third option used in this study is structural heteroscedastic-in-mean (SHM) estimator due to Barrett, Bellemare and Osterloh (2003) in their study of the determinants of price and price variability in Northen Kenya and Kassie et al. (2011) on implicit prices of indigenous cattle traits in central Ethiopia. Because SHM parallel to the generalized autoregressive conditional heteroskedasticity-in-mean (GARCH-M) is useful to analyze the relationship between asset price and volatility (Barrett et al., 2003; Kassie et al., 2011). The SHM regression model therefore can be specified as:

$$ln(price) = X_i\beta_i + \sigma_i\alpha_i + \varepsilon_i$$

$$\sigma_i = Z_i\lambda_i + \upsilon_i \qquad (3.\ 11)$$

Where σ is the conditional standard deviation of the natural logarithm of price allowing for the existence of a direct correlation between price levels and variability (Barrett et al., 2003) and α_i is its coefficient, Z_i is selected exogenous variables in X and λ_i is its vector of parameters, and υ_i is iid error term. These two equations are estimated simultaneously.

Table 3.2. Definition of variables used for goat price determinants

Variables	Type of variables and measurement
Price per head of goat in Eth Birr	Continuous
Breed type	Categorical, Where 1. Central highland 2. Afar 3. Central hararge highland 4. Long eared Somali 5. Short eared Somali
Live weight of goat in Kg	Continuous
Animal age	Categorical, where 1. < 1 year, 2. 1≤ A ≤ 2 years, 3. 2<A ≤3 years, 4. 3 <A ≤ 4 years, and 5. >4 years
Animal sex	Categorical, where 1. Intact male, 2. Female, 3. Castrated male
Body condition	Categorical, where 1. Poor, 2. Average 3. Good
Color	Categorical, where 1. Mixed 2. White 3. Black 4. Red 5.Brown
Occasions	Categorical, where 1. Christian fasting 2. Muslim fasting 3. Holidays 4. Normal
Buyer's type	Categorical, where 1. Traders, 2. Butchers and restaurants 3.Consumers 4. Producers
Buyer's education status	Categories, where 1. Illiterate 2. Read and write 3. Elementary 4. Secondary 5. Above secondary 6. Religious study

Categorical variables denoted as number "1" is default bench mark; ''A'' denotes the word age.

3.3.4. Estimation Methods

The ordered tobit selection model can be estimated consistently using both two-step procedure estimation and Full Information Maximum Likelihood (FIML) estimation. Puhani (2000) did Monte Carlo studies to compare the performance of these consistent estimators in the binary selection case described by Heckman (1979). He concluded that Heckman's limited information maximum likelihood (LIML) estimator may be employed, but given the constant progress in computing power, the FIML estimator is recommended, as it is usually more efficient than the LIML estimator. Monte Carlo simulation for ordered tobit which is developed by Bellemare and Barrett (2006) was also done by Chiburis and Lokshin (2007). As Puhani (2000), they also suggested FIML if the data exactly meet the model specifications and especially when absolute value of rho (ρ) is high. FIML was also appropriate estimator for SHM due to Barrett et al. (2001).

OLS estimation was employed to analyze hedonic price model using HCCM. Heteroscedastic hedonic model was also analyzed using FGLS estimator. FGLS and FIML estimators yield consistent and efficient estimates of parameters of interest whereas OLS estimator of HCCM provides only asymptotically consistent parameters (Long and Ervin, 2000; Cai and Hayes, 2008). Version 11 of the STATA software (Stata Corp, 2009) was used for econometric analysis in this study.

4. RESULT AND DISCUSSION

4.1. Decision and Extent of Market participation

4.1.1. Descriptive Analysis of Market Participation

Table 4.1 summarizes the descriptive statistics for the variables used in the next section. About 82% of households were male headed with an average size of 7.19 people. Average age of household head was 45 years. Average household income was 43 ETH birr per day or less than 6 birr (US $ 0.32) per person per day. This reflects that the sample farmers are living under abject poverty.

Households own goats with an average herd size of about 1.4 TLU. This is almost threefold larger than the 0.5 TLU per household reported by Negassa and Jabbar (2008). The livestock production system is dynamic which responds to the consequences of climate and range land change. One good example of this dynamism is that pastoralists have shifted in to rearing more of species like goat which are hardy and more adaptive to recurring drought and shortage of feeds. In the face of increasing trend of average flock size, the large standard deviation of herd size in table 4.1, indicates the existence of a substantial difference in the number of goats that different households are rearing.

The average sale and purchase of goats is found to be 0.59 and 0.29 TLU leading to a net sale of goats, of 0.7 TLU per household per year, which is about half the average goat herd size. Despite this, sale of goats show an improvement as compared to Negassa and Jabbar (2008) finding. This could be related with flock size increasing trend and improvement in access to market. This result seems to be counter intuitive with the fact of low household income. However, the result is consistent with the findings of IFPRI (2005) which reported a weak poverty reduction impact of livestock production.

Households which are net buyers conducted higher transaction costs as compared to net sellers and autarkic. This reflects people are more willing to enter the market for smaller volume of purchases than sales. As expected, variable fees represent a higher share of price. Variable costs that vary with the amount of transaction were 21% larger than fixed costs that do not vary with the amount of transaction.

Table 4.1. Descriptive statistics of respondent households

Variables	Mean	Std. Dev.
Female household head dummy	0.82	0.39
Household head age (years)	44.83	13.36
Household size (persons)	7.19	2.77
Income (ETH Birr)	42.88	67.96
Number of goat owned (in TLU)	1.40	1.54
Fixed fees (ETH Birr)	30.33	71.27
Variable fees (ETH Birr/ goat in TLU)	45.96	92.51
Purchases (net buyers)	0.76	1.01
Autarkic	0.65	1.03
Sales (net sellers)	0.69	0.69
Avg. price of goat (ETH Birr)	561.14	206.01

Source: own survey

4.1.2. Determinants of the Decisions on Market Participation

The ordered tobit selection model consists of estimating an ordered probit at the first stage and then estimating three linear regression equation, i.e., the amount of participation is conditional to being net buyers, autarkic, and net sellers. The first attempt to estimate this model was with the most commonly practiced estimation method of the Heckman two-step procedure. However, the coefficient of correlation of error of the ordered probit and the linear regression (rho) is out of range ([1,-1]). This problem simply solved using frequency weighting. However, implementation

of the two-step procedure became impossible. Thus this study used Full Information Maximum Likelihood (FIML) estimation method to simultaneously estimate the selection and outcome equations. Following this, the data was estimated simultaneously and then selection biasness tested through likelihood ratio (LR) test.

This study considered pooled cross-section data based on variance-covariance estimation. Since conditional expectation disturbance of the model and selection equation were correlated, the likelihood ratio (LR) test of the null hypothesis (no selection-biasness) is strongly rejected reflecting the existence of selection biases across regions (see appendix 2). This is typical evidence of selectivity of household goat marketing behavior.

As Verbeek (2004) noted on ordered probit, the sign of the independent variables indicates its influence on the decision of households whether tend to be net buyer, autarkic or net seller. Based on the logical order of market participations, the positive sign of the independent variables indicates that net buyers more likely to be autarkic and autarkic households more likely to be net sellers. In contrast, the negative sign of the independent variables indicates that net sellers more likely to be autarkic and autarkic households more likely to be net buyers (see table 4.2).

Sex of household head was found to be an important determinant of farmers' decision on market participation decision. The positive and significant coefficient estimate shows that male–headed households have higher probability of being net sellers than female-headed. This reflects that male-head households are more likely to participate in the market to sale more and purchase less or to sale and purchase more where the sales are disproportionately higher than purchase Negassa and Jabbar (2008) and Bellemare and Barrett (2006) report that women headed households participate in the market to a lesser extent where they buy more and sell less. This is because rearing of goats requires a lot of time for tending them to the bushes, which women headed households often lack as women have a lot of domestic work.

The age of household heads exerts a decreasing convex effect on market participation up through 74th percentile of the data at which point the effect switches to positive. At lower age level, households decision to purchase increase and/or the decision of sale decreases with age of household heads leading to a higher tendency to be net buyers. However, households with age of the head exceeding 50 years tend to move from being autarkic into being net sellers. Therefore, people during most of their productive age buy more and sale less (or at least have disproportionately higher purchases than sales) while during their retirement period they tend to buy less and sale more (or have disproportionately higher sales than purchases). This suggests that pastoralists use goats as store of value (saving) which serves as a means of consumption smoothing to ensure adequate future consumption. This result is consistent with that of Bellemare and Barrett (2006).

Household size is found to positively and significantly influence the likelihood of households' market participation with higher sales to purchase ratio. A possible explanation for this result is that as the number of household member increases, the demand for cash increases making it more necessary for the households to participate in the market. This is in line with the finding of Bellemare and Barrett (2006) in Ethiopia and Kenya and Gani and Adeoti (2011) in Nigeria.

Total fixed cost of market participation was also found to be an important determinant of households' decisions to participate in goat market. The positive and significant coefficient estimate shows that at higher fixed cost of participation, people tend to move from being net buyers to net sellers. This is can possibly be explained with the need for recovering sunk costs. This is in line with the general conclusion of Goetz (1992) and Holloway et al. (2000); among all barriers influencing market participation decision, fixed cost is the most significant factor including their decision to be either of net buyers, autarkic or net sellers (Bellemare and Barrett, 2006).

The effect of income on household market participation decision seems extraordinary. The economic decision of household that have high income is found to be either one of buy less and sell more number of goats or buy more and sell even more, which is probably the more likely situation. Large income could possibly be an indication of large herd sizes and the amount of meat a given household can consume in a year cannot exceed a certain maximum level for which for owners of large flocks, high levels of net sales becomes inevitable. Moreover, this could be an indication of the fact that high annual income encourages households to divert resources in to the purchase of large animals (cattle and camel) instead of small animals (goat). This is because relatively rich people use large animals as a wealth accumulation and use small ruminants as 'fence' from selling large animals. This is consistent with the finding of Ethui et al. (2009) and the statement Kanani (2009) that goats in Central and Eastern Africa are exchanged for the economic necessities, while the large animals bring high social status to their owners.

A very important parameter to understand the contribution of goat towards the livelihood of pastoralist households and also in determining their market participation is the share of goat in total livestock owned in TLU (GSHRTLU). Model results show that GSHRTLU is an important determinant of market participation decision of households. Households with large GSHRTLU have higher tendency to be net sellers. This shows that households that give priority or more emphasis to goat rearing have higher tendency to be net sellers.

Distance to goat markets is found to have a negative and significant influence on the decision to participate in goat marketing, which is consistent with theoretical expectation. Households which are near to towns where there is livestock market have lesser tendency to be net sellers. This result is mainly associated with the effect of fixed cost on market participation. This result is consistent with the findings of Bahta and Baue (2007), and Alene et al. (2008) and Gani and Adeoti (2011) while it is in direct contrast with the findings of Balagtas et al. (2007) which concluded that distance to preferred markets positively affects market participation. It is also

different from the findings of Ethui et al. (2009) which concludedthat distance from market is not a barrier for market participation.

Table 4.2. Estimation results for the first stage of the ordered tobit selection model

Variables	Coefficients	Standard Error
SEX	.2410903**	.1081883
AGE	-.0545445***	.0175612
AGSQU	.0005556***	.0001719
HHSIZE	.0727307***	.0157786
LNINC	.0817496**	.0366842
TRNSCTLU	.0118463	.0269856
GSHTLU	.0029033**	.0013441
FTRNSCST	.0023761**	.0009431
MKTDIST	-.0137617***	.0010519

*, **, *** represent significance at 0.1, 0.05, and 0.001 levels respectively

Source: own survey

4.1.3. Determinants of Amount of Market Participation

The second-stage estimation aims at identifying the main determinants of the extent of market participation for each of the net buyer, autarkic and net seller categories conditional on their positive decision to participate in the market. The number of goats sold by female–headed households was significantly lower than male head households. This is associated with household choose to be net seller or net buyer. This is in line with the work of Omiti, Otieno, Nyanamba, and McCullough (2009) on the intensity of maize market participation, however, with the same study they found out that the intensity of milk and vegetable market participation is similar for male-headed and female-headed households. This reveals the set up of an activity with household head is important cause of variation of intensity of market participation between male-headed and female-headed households. In the case of goat management, it requires long walk for search of water and feed so it is more friendly with male-headed households than female-headed households.

The amount of goat buy and sell vary through individual life time. With life cycle effect, households buy more and sell less, beyond the age of 48 years, they tend to switch to sell more and buy less. This is consistent with Bellermare and Barrett (2006) findings in pastoralist's area of Ethiopia and Kenya, i.e., when the age of household head is greater than 50 years they tend to increase their commercial off take rate.

The influence of household size on the amount of market participation of net buyer, autarkic and net seller households was found to be positive and significant. This is in line with Lapar et al. (2003) finding, i.e., transaction cost reduced with increased labor abundance, as a result the volume of transaction increased with household size. The number of goat and ratio of goat were found as an important determinant of the amount of participation decision. Households having large number of goat decide to sell more given the ratio of goat is low. This reflects a household specialize on a particular livestock species means they are using that particular species as a sort of wealth accumulation.

Variable costs exert significant positive effect on the volume of purchase and sale of net buyer, autarkic and net seller households. This reflects the variable cost increased if and only if the amount of goat transaction increased. This is contrary to theoretical assumptions of transaction cost; however it is line with empirical result of Bellemare and Barrett (2006). This is because similar with those scholars variable costs are disaggregated as variable fees (such as tax fees and animals transportation cost) and distance to market. Variable fees are made for each transaction, otherwise, it is difficult to conduct transaction. Thus variable fees are inevitable cost in goat marketing processes.

Fixed cost has an increasing concave significant effect on the volume of purchase of net buyers but not on the volume of sale of net sellers. This is because net buyers cannot recover sunk cost

of market participation. If the net volume of transaction equals zero, fixed cost has a decreasing convex significant effect. This is associated with the share of fixed cost for each marketed animals. The share of fixed cost for large number of transaction is small and vice versa. This is consistent with the use of economies of scale to optimize their benefit by minimizing transaction cost incurred for each unit of animal.

The estimated effect of goat price on the amount of sale of net sellers and purchase of net buyers was negative and significant. The result shows pastoralists respond to price change. The amount of transaction by net seller and net buyer households decreases significantly as price increases. This reflects net seller exhibit a backward-bending supply curve. This is consistent with herders tend to liquidate animals, as needed, to meet immediate cash needs (Barrett et al., 2005) otherwise they are used as a sort of walking bank (Bellermale and Barrett, 2006). Net buyers appear to have, as for most goods, a downward sloping demand curve.

In contrast, the amount of market participation by the autarkic increased significantly as price increased. The effect of household income on the autarkic was also positive and significant. The volume of transaction for autarkic who have adequate income increases when the demand for goat in the market increases and hence they can enjoy economies of scale. An autarkic is therefore a pastoralist trader that conducts transaction mostly at particular type of market to make profit by adding value or through hoarding system.

The result reveals that pastoralists are sensitive for the change to price of goat. The responsiveness to the change in price can be computed using price elasticity. The price elasticity (η) is computed as

$$\eta_p = \frac{\partial Q}{\partial p} \cdot \frac{p}{Q}$$

Price elasticity is estimated using the coefficient of average price in the second-stage of ordered tobit selection model and the mean value of price and quantities of animal net sold or bought in appendix 3.

At the mean of price and quantity of animals transaction, when the average price increase by 1%, both the demand for and supply of goat decrease by less than 0.7 and 0.2, respectively. This reflects both net sellers and net buyers are price inelastic. This is consistent with the notion that pastoralist buy goat during bad seasons (Lim and Townsend, 1998 cited in McPeak, 2004) and sale if cash need arises (Barrett et al., 2006). Thus, traders have high opportunity to exercises market power. In contrast, the autarkic are sensitive to price change. As the law of demand and supply said, autarkic buy more and sale less as price decreases or sale more and buy less as price increases. This is expected because autarkic are mostly pastoralist trader that targets in making profit margin.

Table 4.3. Estimation results for the second stage of the ordered tobit selection model

Variables	Net Buyers		Autarkic		Net Sellers	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Constant	-1.056539	.8258265	2.655741***	.3381407	-3.472319***	.1730435
SEX	.2566309	.2534168	.9476387	.0462922	-.1376729***	.0392249
AGE	.0176448	.0326666	-.4511972***	.0132337	-.0021501***	.0007037
AGSQU	-.0005455	.0003404	.004684***	.0001333	6.45e-06	9.30e-06
HHSIZE	.1433061***	.040384	.0956007***	.009053	.0491293***	.0053181
LNINC	-.0533635	.0663984	.4631408***	.0159735	.2664646	.0159306
TRNSCTLU	-.0493322	.0777453	-2.181482***	.0393539	.0870623***	.0105491
GSHTLU	.0001302	.0019791	-.0025307***	.0005714	-.0013518**	.0005301
FTRNSCST	.0277997***	.0088469	-.0550596***	.0006659	.00037	.0003868
FTRNSCST SQU	-.0003388***	.0001003	.000153***	2.33e-06	3.86e-07	4.72e-07
VTRNSCT	.0040329***	.0007562	.0339864***	.0001682	.0037611***	.0001928
AVPRICE	-.0008226***	.0002516	.0037909***	.0000482	-.0002036***	.0000628
η	-.6485141		2.5950335		-.1608527	

LR test of indep. Eqns. (rho = 0): chi2(3) = 176.86 prob > chi2 = 0.000

Wald chi2 (10) = 213.41; prob > chi2 =0.0000

LR likelihood = -2755.728

*, **, *** represent significance at 0.1, 0.05, and 0.001 levels respectively

Source: own survey

4.2. Hedonic Price Analysis

4.2.1. Comparisons among Possible Models

Normality test using normal probability plot (NPP) revealed that the shape of probability of density function (PDF) of the price variable is not normal. Consequently, log-transformation based on the quantile-normal graph has been made. Then model specification and normality tests were conducted using Pregibon test for linearity (link-test) and Shapiro-Wilk test methods

and the tests confirms correct specification of the model and normality of the distribution of dependent variable both of which are consistent with theoretical frame work and functional form of hedonic models (see appendix 4-7).

A test on the variance Inflation Factor (VIF) rejected linear correlation among independent variables since the VIF obtained (3.41) is less than the rule of thumb (maximum value of 10) (Leahly, 2001). Both the Breusch-pagan and White test rejected the hypothesis of constant variance at one percent level of significance. This implies assumption of homogeneity of variance is violated to estimate the parametric model using OLS (see appendix 8-10).

Parameter estimates of the hedonic price model using HCCM is presented in Table 4.4. As expected, the coefficients of the variables for HC2 and HC3 estimators are the same. The difference of the two estimators is revealed on their standard errors. Therefore the efficiency differences of HC2 and HC3 estimators are clearly based on the standard errors of coefficients particularly that are mostly affected by heteroscedasticty (see appendix 11). The standard error of HC2 estimation for all coefficients was lower than HC3 estimation. Thus the t-value of the former are inflated possibly leading to erroneous rejections of the null hypothesis. Hence it could not be reliable to draw inferences. In a situation like this, MacKinnon and White (1985) concluded that HC3 outperforms HC2. Therefore, in this study, the HC3 estimation results were used for inferences.

Table 4.4 and 4.5 provides the coefficient estimates and associated standard errors for HCCM, FGLS and modified SHM estimations. As presented in appendix (12) the Akaike and Bayesian information criteria correspond with model comparison of Kassie et al. (2011). The modified SHM model showed an improvement over the single equation models including OLS, HCCM and FGLS. While the FGLS showed an improvement over the ordinary linear regression.

Therefore the results from the modified SHM model estimated using the FGLS will be presented and discussed in the rest of this thesis.

The magnitude of coefficient estimates of all variables exhibit only slight differences across the models. Moreover, the coefficient estimates (at least statistically significant variables) show identical sign across all the models. The significance level of all animal attributes except age dummies between three and four years in the FGLS estimation are significant at 1% in all the different models. Moreover, the signs of the coefficient estimates for the variables weight, weight square, age dummy except between three and four years and body condition dummy have similar signs in all models. Color and horn dummy variables were statistically insignificant even at 10% level in all model specifications.

Animal breed has similar sign and significant parameter in specific markets of Dire Dawa and Bati in all models. Market place has also similar signs and significance levels in all models, except for Yabello in the FGLS estimation. Occasion of animal's transaction has similar sign and significance of parameters across all models.

From the highly variable coefficient estimates, education status was found to be the most inconsistent determinant of goat prices across all models. It has similar sign of coefficient estimates in the FGLS and modified SHM. Among education dummies, only read and write in the modified SHM, and above secondary education status in FGLS and modified SHM were statistically significant. In OLS estimation, education dummies were all statistically insignificant even at 10% level of significance. Type of the buyers has similar sign and significant levels in all the models. Among the buyer's dummies, only consumers were statistically significant while the rest were statistically insignificant in all the models.

4.2.2. Determinants of prices

As table 4.4 and 4.5 shown the important determinants of goat price are animal attributes (such as weight, sex, age and body condition), type of animal breed, market place, occasions, and buyer's characteristics. Weight and weight square were found to be important determinants of goat price in all models. Weight has a positive and significant influence on goat price. This is in line with studies conducted on goat (Dossa et al., 2008), sheep (Kassa et al., 2011; Andargachew and Broken 1993) and cattle (Adugna 2006). Weight square, however, has a small but negative significant effect on price of goat showing that weight has a positive impact up to a certain maximum beyond it will have a negative effect. In particular, goats up to 58 kg commands higher price then starts to decline as weight increases. This diminishing marginal effect is consistent with empirical result of Kassa et al. (2011) and Adugna (2006).

Castration of male goats was found an important determinant of prices. Intact males have on average a price discount of about 35% over castrated males. This reveals castration which usually increases animal's fat has a positive effect on price. Fleshy animals usually generate a premium in Ethiopia (Teressa, 2006) and other developing countries such as Benin (Dossa et al., 2008). In European market, however, fleshy animals are usually discounted (Ward and Lalman, 2003).

The other important variable in determining the price of goats was their age in all models. Even though other studies (Andargachew and Broken, 1993; Ayele et al., 2006; Teklewold et al., 2009; Kassa et al., 2011; kassie et al., 2011) have employed different techniques for measuring the age of the animals, their findings are consistent with that of this paper.

Generally, more than 1 year old goats fetch higher prices than those under one. Particularly, goats that are marketed with the age of between three and four years followed by between one and two years have a price premium over one year, followed by those between two and three

years and greater than four years old respectively. This is consistent with abattoirs requirement and most of local consumers' preferences. Abattoirs require intact male goat that are in most of the cases 15 to 30 kg. This weight is most likely attained at the age of between one and two years due to poor indigenous breed production potential and poor production system. Fleshy animals (castrated male) as discussed above commands higher price due to high demand in the local market and this can be once again related to their age as they usually mature and are supplied to the market between three and four years of age.

Body condition was found to be important determinant of prices of goat. Goats that are marketed with good body condition command prices that were about 15.66% higher than those which are poor (base level) and 7% higher than those with average body condition[1]. The sequence as well as the level of price premium is consistent. This is an indication for the importance of quality of animals in goat price formation which is in line with Teklewold et al. (2009).

The impacts of different breed types on goat prices at specific markets were found variable. This result corresponds with the findings of Jabbar and Diedhiou (2003) where in some cases buyers pay significantly different prices for certain breeds of animals depending on with their preferences. At Dire Dawa market, central Hararghe highland goat breed have a price premium over short eared Somali goat breed. While at Bati market, Bati and Afar goat breed commands, on average, similar prices. This implies that the remarkably big body sizes of Bati breeds was offset by good body condition of Afar breeds.

In this study, the influence of market place on goat price is analyzed using proxy variable, i.e., type of breed across study areas. The coefficient of breed dummies across study markets implies market place was found to be an important determinant of prices of goat. Yabello market was cheapest goat market place and/or Dire Dawa market was the most expensive goat market place.

[1] Price premium of good over average body condition is computed as price premium of good over poor minus price premium of average over poor body condition.

This result is a possible explanation for the fact that the Yabello livestock market is the main source of animals for abattoirs and exporters. This is even more so as the place in which abattoirs are established have almost equal distance with the other animal market places showing the market forces of demand and supply at work (Tisdell and Hartly, 2008).

Occasion of transaction was found to be an important determinant of goat price. Goat marketed during Christian fasting time has a price discount as compared with Muslim fasting month and holiday festive (Easter), which is consistent with Teklewold et al. (2009). This is expected because of lent during which Ethiopian Orthodox Christians are restricted from animal products. Goat marketed during Muslim fasting has a price premium over goat marketed during Easter. This is attributed to the high demand for meat during Ramadan in Middle East countries which is the main market destination for Ethiopian goats. This shows that international demand and hence prices of goats during Ramadan have implications on domestic prices.

Type of the buyer was found to be an important determinant of goat price. Consumers bought goat at a price premium over trader (base level). On the other way, buyers that bought goat for resale purpose pay low price than those who buy for consumption purposes, which is consistent with the findings of Andargachew and Broken (1993) and Adugna (2006),

Buyers who can read and write, and whose education level are above secondary school bought goats with significant price difference as compared with those which are illiterate, which is in line with the work of Kassie et al. (2011). The coefficient of education dummies for read and write was negative and significant whereas for above secondary school it was positive and significant. This is associated with the type of most of the buyers. The former is related with traders that could be most likely able to read and write. While the latter is most probably associated with consumers since buyers whose education status is above secondary school are less likely to be producers and traders.

Price risk premium was captured by estimating parameter relating the conditional standard deviation of logarithm of price to the expected natural logarithm of price. Goat price risk premium was found negative as expected, but statistically non-significant. This is in line with the study on risk premium of cattle in central Ethiopia reported by Kassie et al. (2011). The negative sign implies the commonly observed phenomenon that, as market prices grows more volatile, those who, nonetheless, opt to sell their animals in the markets are somewhat more desperate for cash and so are less able to hold out for a good price from traders (Barrett et al., 2003). In general, the variability of the natural log of price is mainly influenced by phenotypic characteristics of animal (such as weight, sex, age categories, and body conditions), characteristics of the buyers (education status and type of buyers), breed of animal and occasion and place of transaction.

Table 4.4. Estimation result of hedonic price model using HCCM

ln(price)	Coefficient	HC2SE	HC3SE
Constant	4.918428***	.0599434	.0610195
Weight	.070391***	.003466	.0035384
Weight square	-.0005401***	.0000535	.0000548
Female	-.0154862	.0138622	.0140903
Castrated male	.3714521***	.045045	.0464219
1≤ A ≤ 2 years	.0806138***	.0171694	.0174183
2< A ≤3 years	.0659156***	.0161167	.0163749
3 < A ≤ 4 years	.0865608***	.0195322	.0198396
> 4 years	.0564142***	.0253638	.0258417
Average body condition	.1052493***	.0254074	.0187541
Good body condition	.1826858***	.0221464	.0225877
White color	.0011445	.0151461	.0154132
Black color	-.0157638	.0207438	.0211459
Red color	.0048026	.017903	.0182118
Brown color	.0112705	.0177229	.018063
Horn	.0193871	.0156074	.0158839
Read and write	-.2049281	.1366925	.1489702
Elementary	-.0244635	.0152795	.0155122
Secondary	-.0013443	.0184641	.0187589
Above secondary	.0461098	.0241599	.0246231
Religious study	.0103208	.0611084	.0660194
Butcher	-.0468008	.0343855	.0351506
Consumer	.0571116***	.0178325	.0181745
Producer	.0352636	.0217139	.0221894
Afar	.0007124	.0254074	.0260064
Hararghe highland	.2023352***	.0250287	.02546
Short eared Somali	.123149***	.0193224	.019683
Long eared Somali	-.0747543***	.0202167	.0205791
Ramadan	.1042904***	.0196501	.0200665
Easter	.0831056***	.0149613	.0152206
Normal time	.0230442	.0139732	.0142035

*, **, *** represent significance at 0.1, 0.05, and 0.001 levels respectively

Source: own survey

Table 4.5. Estimation result of hedonic price model using FGLS and modified SHM

ln(price)	FGLS		Modified SHM [ln(price)]		Modified SHM [sd.Dev. ln(price)]	
	Coef.	Robust SE	Coef.	SE	Coef.	SE
Constant	4.967483***	.0578266	4.925907***	.0606123	.3895514***	.0235193
Weight	.0773768***	.0036338	.0699524***	.0035437		
Weight square	-.0006622***	.0000634	-.0005314***	.0000587		
Female	-.0329098	.0134052	-.014677	.0129576		
Castrated male	.3509154***	.0499382	.3754388***	.0404165		
1≤ A ≤ 2 years	.0665739***	.0159589	.0801774***	.0183168		
2<A ≤3 years	.0479879***	.0139074	.0671675***	.0176137		
3 <A ≤ 4 years	.0745605***	.0175594	.085158***	.0203814		
>4 years	.0358782	.0251927	.0556866***	.0223555		
Average BC	.0864341***	.0146412	.1040145***	.0163321		
Good BC	.1566328***	.0176909	.1824961***	.0192008		
White color	-.0043243	.0125793	.00058	.0144493		
Black color	-.0099058	.186284	- .0167166	.019419		
Red color	-.0049615	.00146786	.0039138	.0187511		
Brown color	-.0031645	.0162889	.0091355	.0198588		
Horn	.0028244	.01336653	.0200906	.0147481		
Read and write	-.1591687	.1226513	-.2038447***	.0665486		
Elementary	-.0203896	.0132065	-.0242934	.0146217		
Secondary	.00030629	.015928	.001275	.018474		
Above secondary	.0459237***	.0176541	.045379*	.0244792		
Religious study	.0696666	.0537205	.0101377	.0630869		
Butchers	-.0173341	.0287884	-.046086	.0258047		
Consumers	.0580882***	.0148879	.0583875***	.0163584		
Producer	.0322793	.0241145	.0355952	.0208569		
Afar	.0099457	.017267	.0036777	.0240581	-.1106824***	.0334067
Hararghe highland	.237736***	.0231534	.1999374***	.0267358	-.164453***	.032261
Short eared Somali	.1599253***	.0164175	.1210238***	.0260052	-.1815678***	.0258288
Long eared Somali	-.0171302	.0167749	-.0751015***	.0202874	-.0813837***	.0226684
Ramadan	.1008285***	.0186486	.1030512***	.0189016	.0757213***	.0271623
Easter	.0845894***	.0123381	.0838592***	.0154552	.0625371***	.0227754
Normal time	.0139936	.0122273	.0226349	.0154152	-.0018941	.0228692
Sd. Dev. ln(price)			-.0070735	.0285127		

*, **, *** represent significance at 0.1, 0.05, and 0.001 levels respectively

Source: own survey

4.3. Marketing Strategies

In the study areas, goat is the major marketable asset and both smallholder farmers and pastoralists carry out goat marketing strategically. As presented in table 4.6 cash needs, price of goat, and inputs for goat production are crucial factors for goat transaction. Farmers sold goat at times where cash needs and price of goat are high and feed is scarce and bought when conditions are contrary.

Generally, smallholder farmers and pastoralists conduct transaction consistent with demand and supply principles; however, there are phenomena that force them to make transaction regardless of the demand and supply signals. For instance, they could sell when they are faced with high cash needs and bought when they have surplus cash without much regard to the level of price of goat, which corresponds with the findings of Wirnock (1983), Martin (1982) and Sandford (1982) cited in Wirnock (1983) on factors that affect market supply. This is because goat is the main source of cash and a means of wealth accumulation especially for rural households who are poor. Likewise, flock restocking which is the process of re-establishing of flock is not subject to level of price. To some extent, feed shortage is a cause to sell goat whereas enough feed availability is a cause to buy more.

Table 4.6 reveals the strategies that households followed to sell and buy goat. About 60% of respondents sold goat when goat price is high. While 79% of respondents bought goat when goat price is low. This reflects most of households are responsive to price changes particularly during purchasing of goat as having of surplus cash to spend does not carry as much urgency as cash needs in certain conditions.

About 12% and 36% of households made transactions when surplus cash is available and when they have high cash needs regardless of price, respectively. This type of marketing strategies leads to a change in demand and supply of goat, in turn, results a change in price of goat. The

other issues in which a few goat keepers considered on market participation decision were feed availability. The results show that farmers give high emphasis to the availability of enough feed during purchasing of goat as they do to price of goat.

Table 4.6. Smallholder farmers and pastoralists goat marketing strategies.

Criterion	N	%	$\chi 2$	Sig.
Selling				
High price	181	60.3		
High cash need	107	35.7	2.905E2	***
High price and high cash need	8	2.7		
Feed shortage	4	1.3		
Buying				
Low price	225	78.7		
Surplus cash	35	12.2	2.650E2	***
Feed availability	26	9.1		

*** represent significance at 0.001 levels

Source: own survey

Smallholder farmers and pastoralists have clear understanding of how occasions of transaction (festive verses non-festive and wet verses drought season) play a vital role in price formation. This is in line with the result of hedonic price analysis (see table 4.4 & 4.5.). They consider seasonal occasions in their marketing strategies. Some marketing strategies are widely applicable and some others are area specific. In the process of designing of marketing strategies, the role of production system is limited instead mode of rainfall play vital role. In all study areas, producers identified festive seasons as a time of high prices for goats and hence try in as much as possible to exploit the opportunities.

Cash needs are among goat the most important factors that determine smallholder goat producers' marketing decisions. Cash needs become high during summer and meher seasons. Summer season is from July to September and characterized by shortage of food for human and feed for animals whereas meher season is from October to January which is characterized by peak crop production and hence relatively sufficient food and feed availability. During the summer season, demand for goat decreases while supply of goat increases resulting in low price. As a result smallholder farmers who have surplus cash are at an advantage while those farmers who faced cash shortage are at a disadvantage. In contrast, price of goat is high during meher season. The main reason is high demand for goats for weddings and scarification-locally known as "*sedeka*" and also good body condition of animals due to the relatively better supply of feeds. Thus smallholder farmers who opt to sell their animals during meher maximize the monetary benefit that can be obtained from goat production. From point view of the good body conditions and feed availability, smallholder farmers who buy goat during meher can also maximize their future benefits.

Pastoralists at Shinilie district design their marketing strategies particularly that of selling goats to fetch better price and to satisfy high cash needs during wet and dry seasons, respectively. During wet seasons, goat commands high price possibly due to good body condition. During drought seasons, goat commands low price. The main cause for this is high supply of goats with poor body conditions as many farmers opt for selling due to lack of feed. The other marketing strategy which is implemented only if the drought causes high damage on the flock is re-establishment of flock through purchasing after the critical time of drought passed. In this circumstance, price of goat go up due to less supply of goats and /or high demand for goats.

Marketing strategies of pastoralists at Yabello district does not only rely on cash needs but also on surplus cash and feed availability. Cash need is high for purchasing of food commodities and hiring of labor during drought season and immediately after main rainy season, respectively. In contrast, cash becomes relatively surplus during cool dry season (i.e., from May 15 to July 15).

In this season, feed is enough to keep extra number of goats. Since supply of goat with poor body condition is high during drought season, price of goat is cheap. While during cool dry season price of goat is expensive due to low supply of goat and high demand for goat. This reflects even if pastoralists design such type of marketing strategies logically related with recurring and severe drought, it makes them disadvantageous. In contrast, pastoralists exercise unique marketing strategies for male goat that are between 13 to 35 kg ranges targeting export market. They make advantage by holding animals during ban time and supply them during normal time.

In general, goat keepers know the seasons during which enough feed is available and hence goats command high prices. On the other hand, goat keepers identified seasons in which high cash is required and feed is short as a time during which goats command low price. This is because supply of goat probably with poor body condition is high either to minimize risk during drought season or to satisfy high cash need given livestock is the mainstay of pastoralist's livelihood. This season based marketing strategies results variation of goat demand and supply across seasons, in turn, it leads to variation of price across those seasons.

The result of qualitative analysis of marketing strategies and hedonic price analysis are analogous and give evidences for what marketing strategies lead to a higher price. As discussed above, goat keepers clearly understand that occasions cause significant price premium or discount, taking other things constant. On the other hand, producers cannot exploit this market at optimum because they are practicing traditional production system and agricultural products are mostly price inelastic and they keep goat for different purpose.

As table 4.4 and 4.5 shows a goat with good body condition have a price premium, however, under poor production system supplying of such goat is not easy task unless the season is wet. In addition, the problem for smallholder farmers/pastoralists is that high price is not the only criteria for marketing. This is probably related with the use of goat for multiple purposes such as

for wealth accumulation and as fence for cattle from selling to satisfy cash needs. Moreover, goat is a highly liquid asset thus considered as money used for precautionary purposes. This suggests that households' marketing strategies do not only consider higher prices but also on the need on secure some non-cash but highly liquid assets as store of value. This does not however preclude the possibility of sales if and when conducive environment is created for taking advantage of high prices from goat selling.

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The overall study can be concluded that the study found evidence for selectivity of household goat marketing behavior. The main factors affecting market participation decision and volume of transaction are transaction cost and certain purpose for the production of goats. Households whose livelihoods depend on goat they followed strong life cycles in accumulation of goat herds for future consumption to smoothen their path of consumption indicating that they use their goat flock as a sort of a walking bank.

The responses of households to price changes depend on the objective of their market participation decision. The three different categories of goat producers namely: net sellers, net buyers and autarkic mostly participated in goat market for meeting pressing cash needs, to accumulation of wealth, and profit making, respectively. Hence the first two are irresponsive to price changes whereas the third is responsive to price changes.

The influences of most animal attributes on goat price formulation are related with the amount and quality of meat. however, breed differences in and of itself might not be a cause for price difference at a specific market place but through animal attributes as breed difference implies differences in animal attributes. Thus it is difficult to point out clearly the influence of breed difference on price formation using the revealed preference framework analysis but with its limitation, willingness to pay analysis using stated preference can be a viable option. The effect of type of buyers' and their education status on price formation reflect the in-competitiveness of goat markets. Goat marketed during festive periods in general and festive period (such as Ramadan) that have an international demand in particular commands high price.

With a negative and significant sign, the coefficient on of price risk premium showed that net sellers are not responsive to prices implying sellers that opt to sell are somewhat more desperate for cash. This is in line with marketing strategies of smallholder households whose primary objective is minimizing risk. Our analysis also showed that producers are reluctant to participate in the market following the price signal. On the other hand, this tells as producers did not supply goat as the market orientation. As a result stimulation of households to participate in livestock market should come first followed by market orientation.

5.2. Recommendation

In order to make smallholder farmers and pastoralists gain from the subsector, appropriate policies targeting the issues of risk reduction and promotion of commercialization at the grass roots level should be in place. Particularly, policies that encourage goat keepers to use safer ways of wealth accumulation are important alternatives to promote commercialization. Designing incentive mechanisms for rural finance institutes to have out reaches which are easily accessible by the smallholders and pastoralists could be a viable option.

Government as well as non-governmental organization should also work to improve access to market and meteorological information that are important in shaping smallholder farmers' and pastoralists' marketing strategies, to reduce transaction costs, and to maximize their benefit by enhancing competitiveness in the market while also making the farmers responsive to seasonal changes in the goat market.

In order to improve the existing poor production condition consequently to maximize the benefits of households who rear goat, different goat production technologies should be introduced. Government should create favorable environment and incentive mechanisms for meat and live animal's exporters to search and exploit international markets beyond the traditional markets in the Middle East countries. Particularly, farmers would benefit more if other countries with stable demand are targeted for expanding the export market.

Finally, we recommend further study on implicit price analysis using stated preference framework especially to cross check the effect of breed on price setting which is inconsistent at different market place.

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APPENDICES

1. Conversion factor of tropical livestock unit (TLU)

Livestock Category	TLU
Camel	1.43
Cattle	1.0
Equines	0.5
Goats	0.1
Sheep	0.09

Source: Berremere and Barrett, 2006

2. Variance-Covariance estimation for three clusters in region

LR test of indep. Eqns. (rho=0)

Chi2(3) = 176.86; Prob > chi2 = 0.0000

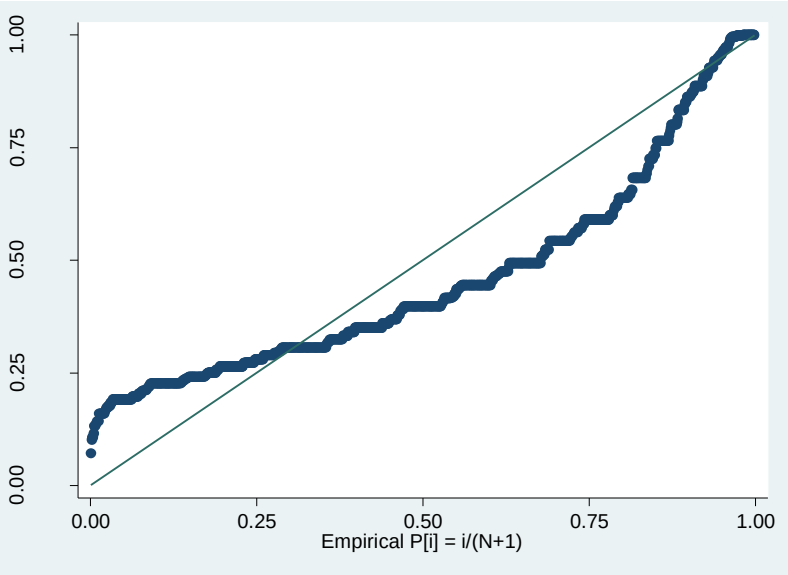
LR likelihood = -2755.728

Wald chi2 (10) =. ; prob > chi2 =.

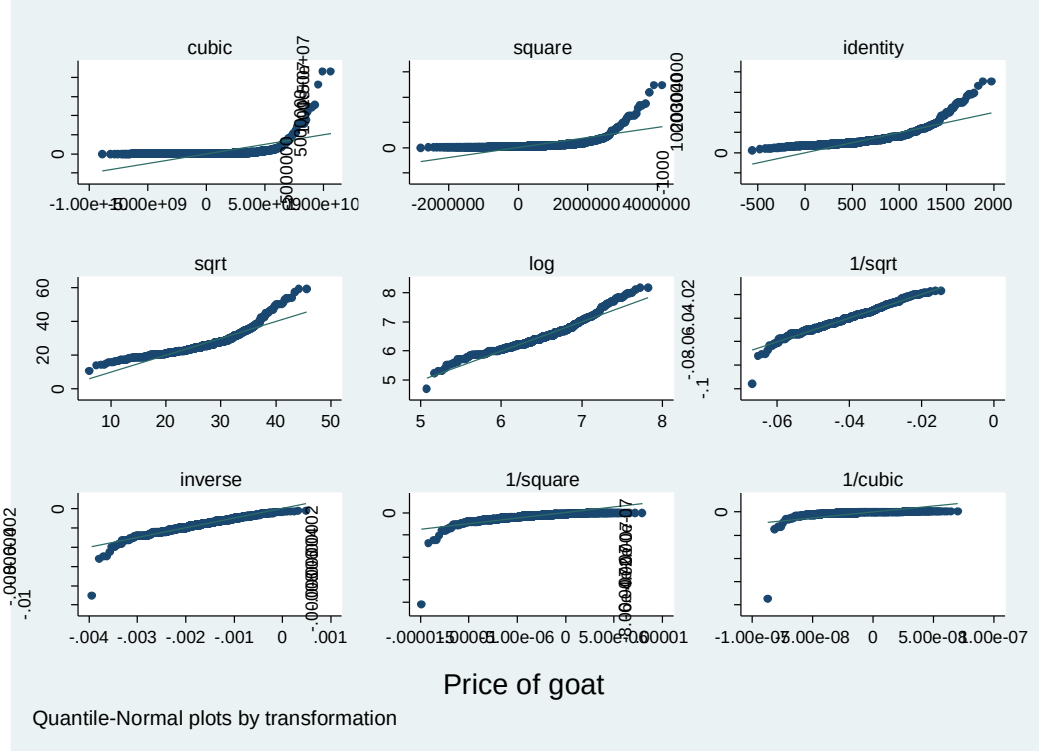
3. Mean value of amount of transaction and average price

Market participation categories	Mean	
	Amount of transaction (TLU)	Average price (Birr)
Net buyer	.76148148	600.32704
Autarkic	.64615385	442.32077
Net sellers	.69130435	546.1575

4. Appendix: Normal Probability Plot (NPP) test for price



5. Quantile-Normal Plots for price



6. Shapiro-Wilk test for normality

Variable	Obs	W	V	Z	Prob > Z
Price	1062	0.72804	181.182	12.908	0.00000

7. Link test for model misspecification

lnprice	Coef.	Std. Err.	T	p>|t|
hat	.6194294	.2991664	2.07	0.039
hatsq	.0288344	.0226445	1.27	0.203
cons	1.250466	.9857294	1.27	0.205
F(2, 1025)	2857.59			
Prob > F	0.0000			
R-square	0.8479			
AdjR-square	0.8476			

8. Breush-pagan/cook-weisberg test heteroskedasticity for explanatory variables included in the hedonic model

   Ho: constant variance

   Variables: fitted values of lnprice

   Chi2 (1) = 18.03

   Prob > chi2 = 0.0000

9. White's test heteroskedasticiy for explanatory variables included in the hedonic model

   White's test for Ho: homoskedasticity

   Against Ha: unrestricted heteroskedasticity

   Chi2 (386) = 642.75

   Prob > chi2 = 0.0000

Cameron & Trivedi's decomposition of IM-test

Source	Chi2	df	P
Heteroskedasticity	642.75	387	0.0000
Skewness	54.38	30	0.0042
Kurtosis	4.57	1	0.0325
Total	701.70	418	0.0000

10. Multi-collinearity test for explanatory variables included in the hedonic model

Variable	VIF	1/VIF
Weight	28.56	0.035014
Square of weight	25.62	0.039035
Female	1.34	0.746660
Castrated male	1.25	0.802601
1≤ A ≤ 2 years	1.42	0.705089
2<A ≤3 years	1.77	0.566197
3 <A ≤ 4 years	1.97	0.507932
> 4 years	1.97	0.507059
Medium body condition	2.23	0.449377
Good body condition	2.44	0.409876
White color	1.65	0.606037
Black color	1.32	0.755005
Red color	1.78	0.561022
Brown color	1.39	0.718294
Horn presence	1.25	0.803009
Afar	1.57	0.637535
Central highland hararghe	2.08	0.480550
Short eared Somali	2.33	0.429935
Long eared Somali	3.43	0.291663
Muslim fasting (Ramadan)	1.73	0.579407
Holiday /Easter	1.76	0.566574
Normal time	1.56	0.642606
Read and write	1.06	0.944387
Elementary	1.74	0.574137
Secondary	2.15	0.464631
Above secondary	1.41	0.707502
Religious study	1.09	0.921108
Butcher and restaurant	1.25	0.796941
Consumer	1.76	0.569311
Producer	1.34	0.746961
Mean VIF	3.41	

11. Szroeter's test for homoskedasticity

Ho: variance constant

Ha: variance monotonic in variable

Variable	Chi2	df	P#
Weight	29.88	1	0.0000
Square of weight	29.88	1	0.0000
Female	54.14	1	0.0000
Castrated male	2.18	1	0.1395
1≤ A ≤ 2 years	0.10	1	0.7535
2<A ≤3 years	14.98	1	0.0001
3 <A ≤ 4 years	2.15	1	0.1425
> 4 years	65.35	1	0.0000
Medium body condition	10.75	1	0.0010
Good body condition	5.75	1	0.0165
White color	0.16	1	0.6906
Black color	0.74	1	0.3912
Red color	1.56	1	0.2123
Brown color	9.75	1	0.0018
Horn presence	3.73	1	0.0534
Afar	4.60	1	0.0319
Central highland hararghe	2.07	1	0.1498
Short eared Somali	15.57	1	0.0001
Long eared Somali	9.43	1	0.0021
Muslim fasting (Ramadan)	0.18	1	0.6711
Holiday /Easter	1.64	1	0.2004
Normal time	20.19	1	0.0000
Read and write	26.29	1	0.0000
Elementary	1.31	1	0.2531
Secondary	2.51	1	0.1129
Above secondary	0.00	1	0.9727
Religious study	0.20	1	0.6587
Butcher and restaurant	10.50	1	0.0012
Consumer	2.14	1	0.1435
Producer	0.05	1	0.8255

#unadjusted ρ-values

12. Akakic and Bayesian estimation for hedonic model

Model	Obs.	ιι(null)	ιι(model)	df	AIC	BIC
HC3	962	-567.7038	341.6626	31	-621.3252	-470.3858
FGLS	962	-648.8858	278.7516	31	-495.5032	-344.5637
SHM	962	-	75.66778	48	-55.33555	178.3771

List of key informant

N.O	**Name**	**Study districts**
1	Endrise Mohammed	Bati
2	Abidela Mohye	Bati
3	Abdu Hassen	Bati
4	Abdi Ali	Bati
5	Edrahim Sied	Bati
6	Sied Ahmed	Bati
7	Abdu Mohye	Bati
8	Endrise Sied	Bati
9	Hassen Ali	Bati
10	Qumane Subagle	Shinile
11	Jamal Allahi	Shinile
12	Xusen Dhabar	Shinile
13	Axmed Diriye	Shinile
14	Ali Cige	Shinile
15	Ismail Husen	Shinile
16	Cilmi Baded	Shinile
17	Axmed Wabari	Shinile
18	Kanu Dida	Yabello
19	Bulie Bukka	Yabello
20	Gussie Gerie	Yabello
21	Ariro Girbicha	Yabello
22	Kuttu Gurn	Yabello
23	Shehan Mullo	Yabello
24	Kenechora Dida	Yabello
25	Kash Tunu	Yabello
26	Cheriffi Weko	Yabello

Questionnaire developed to collect information on market participation decision and volume of transaction of goat.

1. Date_____ (DD/MM/YYYY)
2. Interviewer's name _____
3. Region_____Zone_____Woreda_____
   Kebele (PA) _____ Village (Got) _____
4. Main job of the respondent

   a. Farmer
   b. Pastoralist
   c. Merchant
   d. Farmer merchant
   e. Religious leader (worker)
   f. Government employer
   g. agro-pastoralist
   h. Other_____

5. If you are agro-pastoralist/ pastoralist, what is your mobility pattern?
   a. Sedentary
   b. Transhumance
   c. Nomadic
6. Gender of respondents

   a. Male
   b. Female

7. Marital status of respondents

   a. Married
   b. Single

8. Age of respondents _____ (years)
9. Educational level
   a. Illiterate
   b. Adults education
   c. Spiritual education
   d. _____year of formal education

10. Respondent's religion

    a. Orthodox
    b. Islam
    c. Protestant
    d. Other_____

11. Social participation
    a. Participation in the administrative unit of the locality
    b. Participation in community leadership
    c. Working with NGOs
    d. No participation
    e. other

12. Family size and composition

a. Total family size: Male _____Female_____

Sex	Age in years					
	< 2	2-10	11-15	16 - 30	31- 55	> 55
Male (#)						
Female (#)						
Labor contribution (YES/NO)						

13. How long is your farming experience? _____(year)
14. How long is your goat rearing experience?_____(year)
15. Who makes the important decision of agricultural production (like crop to produce, livestock to raise etc.) in the household?

a. Husband
b. Wife
d. The family
e. Other_____

16. Who makes the important decisions (like buying, selling, slaughtering, medicating, etc) about goat?

a. Husband
b. Wife
c. Husband and wife
d. Children
e. Husband and children
f. Wife and children
g. The family

17. Who is the owner of goat in the household?

a. Husband
b. Wife
c. Husband and wife
d. Children
e. Husband and children
f. Wife and children
g. The family

18. Who is the seller of goats?

a. Husband
b. Wife
c. Husband and wife
d. Children
e. Husband and children
f. Wife and children
g. The family

19. What are the sources of income for living?

a. Crop production
b. Livestock production
c. Wage labor
d. Crop and livestock production
e. All
f. Other_____

20. Which of the income generating activities you focused on and give priority to?

a. Crop production
b. Livestock production
c. Wage labor
d. Crop and livestock production
e. All
f. Other_____

21. Do you have sufficient family labor power for livestock production?

a. Yes
b. No

22. How many of your family members do not engage in livestock production?_____
23. How many of your family members do not engage in goat production?_____
24. Do you hire labor under labor scarcity for goat production?

a. Yes
b. No
c. Other_____

If yes, how much do you incur per year_____(Birr)

25. Do your family work for others with payment when you are available?

a. Yes
b. No
c. Other_____

If yes, how much do you earn per year_____(Birr)

26. Who are the participants of off farm activities?

Household members	Participation Yes = 1, No = 2	If yes, how much do you earn per year
Husband		
Wife		
Children		
Male		
Female		

27. What are your sources of cash?

a. Crop selling
f. Borrow from credit institutions

b. Livestock selling
c. Sell livestock products
d. Work for wage
g. Borrow from relatives and friends
h. Remittances
i. Other_____

28. If it is livestock selling, which livestock species mainly sold to satisfy your cash need?
    a. Cattle
    b. Camel
    c. Goat
    d. Sheep
    e. Chicken
    f. Others_____

29. Is goat main source of cash for you?

    a. Yes
    b. No
    c. It depends on the season
    d. Other_____

30. Do you have sufficient cash income for living?

    a. Yes
    b. No
    c. It depends on the season
    d. Other_____

31. Is the cash income from crop production increasing or decreasing?

    a. Increasing
    b. Decreasing
    c. It varies
    d. I don't know
    e. Other_____

32. Is the cash income from livestock increasing or decreasing?

    a. Increasing
    b. Decreasing
    c. It varies
    d. I don't know
    e. Other_____

33. Is the cash income from goat increasing or decreasing?

    a. Increasing
    b. Decreasing
    c. It varies
    d. I don't know
    e. Other_____

34. How much your annual income last year?_____Birr/year
35. How much income earn from livestock and goat last year?

Products	Birr/year
Cattle	
Camel	

Goat	
Sheep	
Equine*	
Chicken	
Bee hive	
Milk sell	
Goat	
Other (cows and camel)	
Butter	
Goat	
Other (cows and camel)	
Skin/hide sell	
Goat	
Other (camel)	
Other (specify)	

*Horse, mule, donkey

36. How big is your farm land?_____ha
37. How big is your farm land?_____ha
38. Is your farm size sufficient to sustain your family?

a. It is sufficient
c. It depends on the reason
b. It is insufficient
d. Other_____

39. Do you lease land?

a. Yes
b. No

40. Do you lease out land?

a. Yes
b. No

41. Do you have private grazing land?

a. Yes
b. No

If yes, how big is it?_____ha

42. Do you have private browsing area?

a. Yes
b. No

If yes, how big is it?_____ha

43. Is there common browsing area in your locality?

a. Yes
b. No

If yes, how far from your residuals_____(km)

44. What is proportion of bushes and shrubs from the total land in the village?_____
45. What is the trend of size of common browsing areas?
    a. Increasing b. Decreasing

46. What are the main crops you are producing?

a. Sorghum	d. Faba bean	g. Wheat	j. chat
b. Maize	e. Field pea	h. Barely	k. Other_____
c. Tef	f. Lentil	i. Linseed	

47. Which is the most important crops for you?_____
48. Why?

a. For consumption	e. For construction
b. For selling	f. For medication
c. For livestock feed	g. Other_____
d. For fuel wood	

49. If it is for livestock feed, for which livestock species?
    a. Cattle d. Sheep
    b. Camel e. Other_____
    c. Goat
50. What is the main edible crop?_____
51. In which month price of edible crop is high_____
52. In which month price of edible crop is low_____
53. What livestock do you rear? How many?

Type	How many
Cattle	
Camel	
Donkey	
Horse	
Mule	
Sheep	
Goat	
Kids (< 6 months)	
Buck kids (6-12 months)	
Does kids (6-12 months)	
Bucks (> 1 yr)	
Does (> 1 yr)	
Castrated	

Chicken	
Bee hives	

54. What are the fixed assets owned?

Resources	Yes =1, No=2	Number	Total value (birr)
Rural Houses			
Grass roofed			
Iron sheet			
Urban houses			
Grass roofed			
Iron sheet			
Only land			
Telephone			
Television			
Radio			
Mill			
Vehicle(truck)			
Motor vehicle			
Bicycle			
Animal court			
Hand pool cart			
Water pump			
Others (specify)			

55. Do you have permanent tree?

Permanent asset	Yes=1, No=2	Hectare	Estimated value
Eucalyptus trees			
Coffee			
Chat			
Horticulture (e.g. banana, orange)			
Others (specify)			

56. What benefits do you get from your livestock?

a. Milk, meat, egg, honey, hide/skin, manure

b. Sell in the market

c. Generate cash during difficult time's

e. Serve as collateral

f. Make me self dependent

g. Make me respected

d. Home consumption h. Other_____

57. Which of the animal/s do you focus on and give emphasis to?

_____

_____

58. Why?

_____

_____

59. If you are rearing goats, what are the merits of goat?

a. source of cash when cash needed f. serve as collateral

b. sell of live animals g. serve as insurance

c. home slaughtering h. make me respected

d. sell of by-products (milk, butter, and hides)

e. consumption of their by-products (milk, butter, hides and cheese)

i. Other_____

47. What is the main objective of rearing of goat?

a. Marketing of live animals
b. Marketing of their by-products
c. Home consumption
d. Consumption of their by-products
e. Other_____

60. What are the risks related to goat keeping you have faced?

a. Outbreak of diseases c. Theft

b. Death d. Other_____

61. How risky is goat production in your area?

a. Very risky c. Not risky

b. Moderately risk d. Other _____

62. If you are not produced goat, why don't you rear goat?

a. Cultural problem d. Scarcity of labor

b. Underestimating their importance e. Shortage of browse

c. Financial problem f. Other_____

63. Is there feed shortage for goat in general?

a. Yes c. it depends on the season

b. No

64. When feed shortage critical?_____
65. What do you do to cope up this critical feed shortage?

a. Send my animals to other area
b. Reduce flock size by selling
c. Rely on commercial feeds
d. Other _____

66. Do you have goat marketing experience?

a. Yes
b. No

67. How long is your goat marketing experience? _____(year)
68. Do you participate in goat marketing (i.e. purchasing and selling) last year?

a. Yes
b. No

69. If yes, what is your participation?

a. Selling
b. Purchasing
c. Both
d. Other

70. If no, why?

a._____

b._____

c. _____

71. In which market do you sell your goat?

a. Rural town market
b. Woreda town market
c. Big town/ city market
d. Other_____

72. Which market is the most suitable to sell goat?_____
73. How far from your resident?_____(km)
74. How many goat sell from January 2012 up to now?_____
75. In which month average of price of goat is high_____
76. In which month average of price of goat is low_____
77. How do you determine number of animals sold per a market?

a. On cash need
b. On the market price
c. On feed availability
d. I don't know
e. Other

78. How much is the revenue generated from goat sales last year?_____(ETH)

79. From which markets do you buy goat?

a. Rural town market
b. Woreda town market
c. Big town/ city market
d. Other_____

80. Which market is the most suitable to buy goat?_____
81. How far from your resident?_____(km)
82. How many goat buy from January 2012 up to now?_____
83. How do you determine number of animals bought per a market?
    a. On cash availability
    b. On the market price
    c. On feed availability
    d. I don't know
    e. Other
84. How much is the cost of goat purchasing last year?_____(ETH)
85. Do you have road access to the nearest town/city?
    a. Yes
    b. No
86. How far your resident from the main road?_____km
87. What is the nearest town/city where you sale your products? _____
88. How far your resident from the nearest town/city?_____(km)
89. Do you have transport access to the nearest town/city?
    a. Yes
    b. No
90. What is the time spent to arrive at the nearest town/city market?_____(hr).
91. What is the time spent to arrive at the most suitable market?_____(hr)
92. What is the cost of transportation to the nearest town/city market?_____(Birr).
93. What is the cost of transportation to the most suitable market?_____(Birr).
94. Do you assess livestock market before bring the animals to the market?
    a. Yes
    b. No
95. How many times do you monitor the market for one time transaction?_____
96. What is the time spent per monitoring_____hr
97. Which are your favorite months to sell goat?_____
98. Why this/ those month(s) you choose?

    a. for higher cash need
    b. to fetch better price
    c. due to occurrence of feed shortage
    d. high flock size (high breeding)
    e. Other _____

99. Which are your favorite months to buy goat?_____
100. Why this/ those month(s) you choose?

    a. Low price
    b. to save surplus income
    c. Availability of feed
    d. No need of cash
    e. Other _____

101. As a seller, how do you see the current price of goat?
    a. High
    b. Low
    c. Medium
    d. Other
102. As a buyer, how do you see the current price of goat?

    a. High
    c. Medium

b. Low d. Other

103. Do you face any pressure in the market when you go to buy goat in the market?

a. Yes c. Sometimes

b. No d. Other_____

If yes, who exerts the pressure upon you?

1. The merchants 4. Other buyers

2. Other farmer merchants 5. Other marketers

3. The brokers 6. Other_____

104. Do you face any pressure in the market when you go to sell goat in the market?

a. Yes c. Sometimes

b. No d. Other_____

If yes, who exerts the pressure upon you?

1. The merchants 4. Other buyers

2. Other farmer merchants 5. Other marketers

3. The brokers 6. Other_____

105. Is there a time when you went to sell and could not sell your goat in the market?

a. Yes b. No

If yes, why couldn't you sell your goat?

1. Low price offer 4. The market was disturbed

2. Expected higher price 5. Wanted to take another market

3. Charged my idea 6. Other_____

106. Is there a time when you went to buy and could not buy your goat in the market?

a. Yes b. No

If yes, why couldn't you buy your goat?

1. Low price offer 4. The market was disturbed

2. Expected higher price 5. Wanted to take another market

3. Charged my idea 6. Other_____

107. In which season goat is highly demanded in the market?

a. Festival e. Shortage of substitute goods

b. Fasting f. Bad season

c. Good season g. Other_____

d. When export market opened

108. In which season goat is less demanded in the market?

a. Festival e. Shortage of substitute goods

b. Fasting f. Bad season

c. Good season g. Other_____

d. When export market opened

109. Why do you sold goat?_____

a. to equate flock size during shortage of feed

b. to satisfy cash need

c. to fetch better price

d. other_____

110. Do you have access to market information for goat marketing?

a. Yes b. No

If yes, what is the source of your market information?

a. Radio d. Brokers

b. Friends and neighbor e. Traders

c. Development Agent f. Others_____

111. On which source of market information do you rely?_____

112. How much is the reliability of the market information?

a. High b. Medium

c. Low d. I don't know

e. Other_____

113. Do you have mobile?

a. Yes b. No

114. The cost of mobile per months_____

115. What is the frequency of movement to the nearest town_____per month

116. What are the costs of goat transactions? How much?

Type of costs	Frequency (or no of goats)	Cost per transaction	Total cost
Fixed transaction cost			
Negotiation (during agreement signing; broker)			
Monitoring (sellers/ buyers transport cost)			
Proportional transaction cost			
Transport cost of goat			
Tax fees			

117. Is their any rural credit institution in your locality?
    a. Yes b. No
118. Do you borrow money in the last two years?
    a. Yes b. No
119. If yes, what is your source of credit?
    a. Savings and credit institutions c. commercial/developmental banks
    b. Informal creditor's d. other_____

120. If your source of credit is formal sector, how much money did you borrow in the last two years? _____birr
121. If you didn't borrow from formal credit institute, why?
    a. High interest rate d. I don't want
    b. Collateral requirement e. Other _____
    c. Availability of other alternatives
122. If your source of credit is informal sector, how much money did you borrow in the last two years? _____birr
123. Do you save if you have any surplus?
    a. Yes b. No
124. Which form of saving do you have used?
    a. Deposit from saving and credit institutions
    b. In kind
    c. Other_____
125. If you are saving in kind, what is that?
    a. Buying of cattle d. Buying of camel
    b. Buying of sheep e. Buying of goat
    c. Buying of crop/pulse f. Other_____
126. What are your coping mechanisms of drought?
    a. Livestock d. Migration
    b. Credit e. Other _____
    c. Aid

If your coping mechanism is selling of livestock, which livestock selling you are sold?

a. cattle
b. camel
c. sheep
d. goat
e. other_____

127. Why?

a._____
b._____
c._____

128. Do you have access to extension services?

a. Yes b. No

129. What is the base of the extension services provision?

a. Weekly
b. Fortnightly
c. Monthly
d. Yearly
e. other_____

130. How many times the extension agents contact you?_____

131. Is the technical support sufficient?

a. Yes b. No

132. On what issues do you want to get technical support?

a. Livestock health
b. Livestock marketing
c. Livestock feeds and feeding
d. Livestock product utilization
e. Other _____

133. Do you have access to veterinary services?

a. Yes b. No

134. Is the veterinary service sufficient?

a. Yes b. No

135. How far from your residents? _____km

136. Is there any variability of need for cash in a year?

a. Yes b. No

137. If yes, when is your cash need becomes high?_____

138. What is/are your means of satisfying the cash need?

a. Borrowing from relatives and friends
b. Borrowing from credit institutions
c. Selling of crops
d. Selling of livestock
e. Other_____

139. If you are satisfying your cash need by selling of livestock, which livestock species is mainly sale?

a. Cattle
b. Camel
c. Sheep
d. Goat
e. Equine (horse, donkey, mule)
f. Other_____

140. Source of income for household (family) per year.

Crop sale		Animal and their products sale		Non-farm & Off-farm activity		Aids of GO's & NGO's*		Others(including remittance)	
Items	Birr	Items	Birr	Items	Birr	Items	Birr	Items	Birr
Sorghum		Cattle		Sale of labor					
Teff		Camel		Petty trading					
Maize		Goat		Cart					
Pea		Sheep							

Bean		Chicken							
Chickpea		Donkey							
Coffee		Milk							
Chat		Butter							
		Hides/Skin							
		Egg							
		Honey							

*GO's= governmental organizations; NGO's=non-governmental organization

Format 1: Animal Attributes

Region:_____Zone:_____
Woreda: _____ Kebele_____
Market place:_____Enumerator's name ___ _____

No	Sex	Dentition	Breed	Condition	Color	Horn	Weight	Price	DD/MM/ YYYY	Time of day	Occasion	Remarks

Format 2: Buyers and Sellers Profile

Region:_____Zone:_____
Woreda: _____Kebele_____
Marketplace:_____Enumerator'sname _____

Buyers							**Sellers**					**Remarks**
No	Sex	Age	Education status	Type	Buyers purpose	Destination	Sex	Age	Education status	Type	Source	

Check list for focus group discussion

- What are the purposes of keeping goat?
- When they sale own goat?
- Why they sale during this particular time?
- How they evaluate the price of goat at this time?
- When they buy goat?
- Why they buy during this time?
- Who they evaluate the price of goat at this time?
- When goat price low and high?
- When cash need high?
- Who they satisfy cash need?
- When cash becomes surplus?
- In what form do you save the surplus income?
- When body condition of goat becomes poor and good? Why?
- Who they pass drought season for livestock particularly goat?
- When rural households face shortage of food? What is/are the remedy?
- What are the marketing strategies used to sell at highest/ to buy at lowest price?

Declaration

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have duly acknowledged and referenced all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged

_____

Signature

_____

Name of Student

_____

University Id. Number

_____

Date